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# Agriculture

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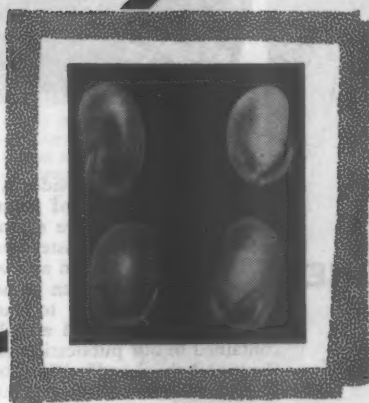
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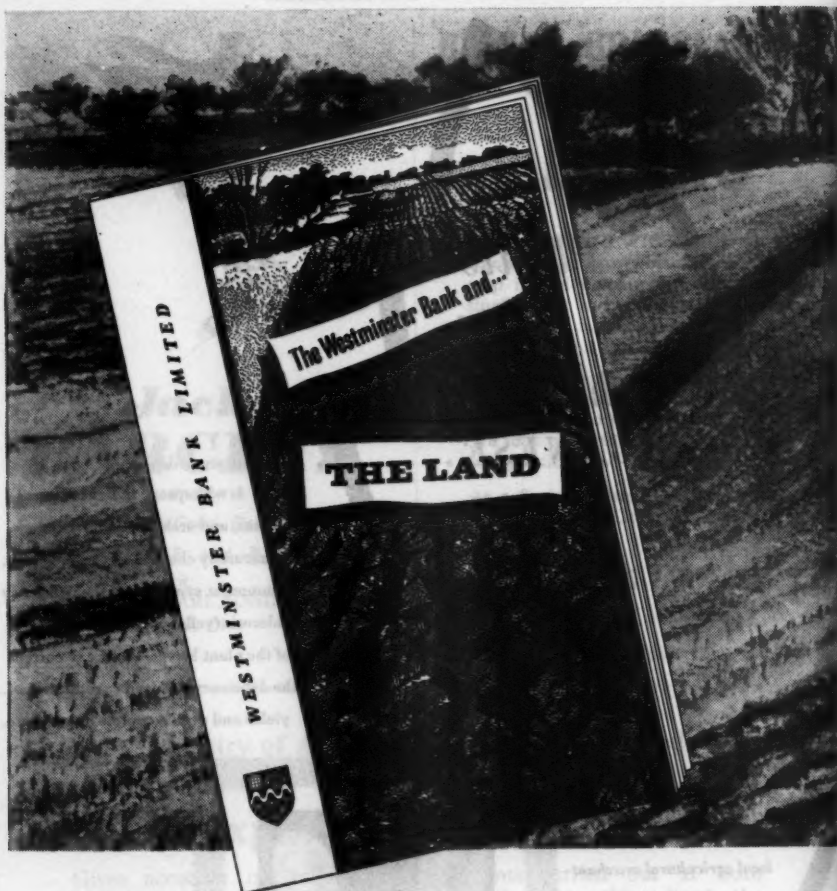
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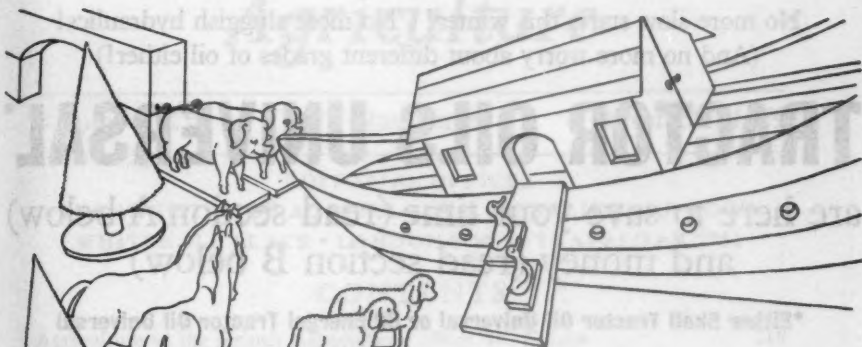
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# Agriculture

Volume LXVI

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## EDITORIAL OFFICES

THE MINISTRY OF AGRICULTURE, FISHERIES AND FOOD  
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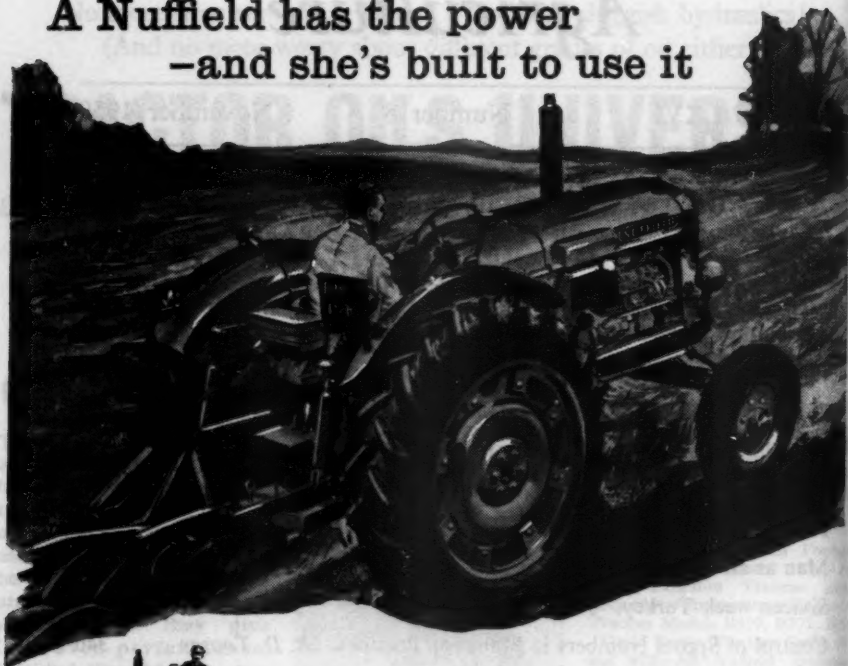
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# Agriculture at the British Association

PROFESSOR W. ELLISON, B.Sc., PH.D.

*University College of Wales*

In no field of human endeavour is the role of science more clearly seen, or of such fundamental importance, than in the age-old enterprise of winning food from the soil. The papers read in the Agriculture section of this year's meeting of the British Association, here summarized, testify to that fact.

PROFESSOR H. G. SANDERS opened the Agriculture Section with an excellent presidential address on "Balance in British Farming". This is a wide subject, but one of increasing importance in these days when, as he emphasized, so many deviations from sound and well-proven husbandry practices are taking place as a result of the introduction of chemical controls for weeds, diseases and insect pests. Although science has provided many aids to the farmer in recent years, many of them are interfering with the balance of farming and nature as we knew it twenty or thirty years ago, and may well be creating yet other problems which the scientist will have to solve.

On the need for balance between various farming systems within the country, and the importance of streamlining the movement of both stock and crops from one area to another, Professor Sanders commented that "really efficient organization of these movements would do much to maintain balance in the country's farming", but he was not certain whether this is a job for the Government or the farmers' organizations.

## *Small farm problems*

The problems besetting small farmers were the subject of two papers—by Mr. D. B. WALLACE (Cambridge University) and Mr. E. A. ATTWOOD (University College of Wales). Mr. Wallace showed that, under normal conditions of management, only one-third of the arable farmers of under one hundred acres in the Eastern Counties can expect a farm income above £500 a year with which to pay for their own labour and provide interest on tenant's capital.

Actual accounts for a small sample of farms have shown that, although a higher proportion of gross output comes from livestock on small farms than on larger ones, there is no evidence that the small farmer is less efficient in the use of any resources other than his own labour. Mr. Wallace suggested that the scale of business should be increased sufficiently to pay adequately for the "overhead" cost of the farmer himself, either by increased physical size, greater output at the same or less cost, or increased intensity of organization. A combination of the last two seems most likely to be successful in the short run, but would probably create further problems for the industry as a whole over a long period.

Mr. Attwood dealt with the problems of the small, livestock farmer, and stressed the need for a larger business to enable the small farmer to meet his



overhead costs. On this class of small farm, over-supply of the main products—milk, eggs and bacon—is already a real problem. Nevertheless, many small farmers are running their farms successfully and making a substantial profit. Very heavy use of bought feedingstuffs is the outstanding characteristic of such farms. In this connection Mr. Attwood questioned the findings of the Caine Committee on Grassland Utilization, which, he said, had not really shown that the small farmer with an intensive grassland policy was better off than one using a large amount of bought feedingstuffs efficiently: all they actually proved was that efficient farmers make high profits and inefficient farmers make low ones!

He feels that in the "grass versus concentrates" controversy we have lost sight of the fact that what the small farmer wants is better grass to carry more stock, and that concentrates and intensive grassland are not competitive but complementary. By such a combination he can achieve high output and higher profit. Low output is no answer to a small farmer's problem. He may have to increase his range as well as his quantity of products. Current developments and research are showing how this may be done on such farms—for example, by broilers, turkeys, high-output seed cash crops, and the production of beef and mutton through intensive grassland utilization.

### *Meat supply and consumer needs*

DR. J. HAMMOND took the chair at a symposium on meat, in which papers were given by MR. W. E. BOWDEN (Fatstock Marketing Corporation), MR. R. A. MACKNESS (Cambridge University) and MR. STEPHEN WILLIAMS (Messrs. Boots Ltd.). Speaking of quality and the marketing of meat, Mr. Bowden dealt first with the supply position, and summarized the future meat import prospects by saying that best chilled beef is likely to be scarce for several years, frozen beef plentiful, and mutton, lamb and pig meat (especially bacon) supplies will continue to increase.

He foresaw a decline in imports of store cattle for some years to come, and emphasized the need for greater production of this class of stock at home, especially through the rearing of beef calves from the dairy herd.

Present-day needs of both the butcher and the housewife were discussed in relation to production and marketing. Both Mr. Bowden and Mr. Mackness called for more research as well as objective information relating to breeding, feeding and production of all classes of meat. There is a great need, said Mr. Bowden, for meat research centres to be established at several large slaughter-houses in different parts of the country; Mr. Mackness hoped that the envisaged Meat Institute will eventually be able to establish means of providing much needed data for the industry.

MR. STEPHEN WILLIAMS used slides to illustrate practical examples of how A.I. has revolutionized what he called the layout of reproduction in our beef industry. He also dealt in a very practical manner with methods of calf-rearing and grassland utilization which he has adopted, not only to cheapen production but also to enable him to cope with great numbers of beef calves bred from dairy cows.

Throughout the symposium there were several references to show-ring and pedigree sale values, as against the requirements of the commercial producer, the butcher and the housewife.



## Challenges to research

This topic was, however, perhaps best summarized by SIR WILLIAM SLATER (Agricultural Research Council) in his opening paper of the session, entitled "Challenges to Agricultural Research". He said: "We are beginning to doubt whether the art of animal breeding, in which Britain has excelled, has not reached the limits of its possibilities. The breeder's 'eye' is gradually being replaced by objective measurements."

Sir William gave a most interesting and concise account of the way in which agricultural research is carried out in this country, illustrating by examples the role played in a complicated chain of events by the farmer, the adviser, the agricultural research worker and in some cases the pure scientist. "The challenges to research from agriculture grow rather than diminish in number with the rise in efficiency of production . . . calling for greater knowledge and skill on the part of the research worker as he delves more deeply into the fundamental processes underlying the growth of crop and stock." He divided the challenges to agricultural research into three groups: crop husbandry, animal husbandry, and farm machinery and buildings, and dealt with a number of suitable examples from each group.

## Eelworm

Individual examples of the work being carried out on two of the major problems facing the industry today were illustrated by talks from MR. F. G. W. JONES (Rothamsted) and DR. J. DEANS RANKIN (Compton). Mr. Jones spoke of the eelworm or nematode problem of various farm crops and pointed to some of the difficulties of classifying and controlling these pests. There is still a great need for positive methods of chemical control at economic prices, and attention is now being given to the use of systemic chemicals which upset the host-parasite relationship without killing the parasite. The successful culture of plant nematodes in artificial media would be a major achievement in this particular field of research, since it would eliminate many of the complexities and complications of soil and plant environments.

## Johne's disease

Dr. Deans Rankin began his talk on Johne's disease by saying that during the next twelve months this disease would kill off 30,000 of our dairy cows, and would cost the dairy farmer and the beef breeder between them three or four million pounds. The study of this disease is made both difficult and costly because it cannot be investigated through the use of small, quick-breeding animals such as mice, rabbits and guinea-pigs; in this particular field, one cow equals one mouse! Another difficulty is the protracted incubation period of the disease, which may be from one to four years or even longer. Fortunately, facilities are now available at Compton, for the first time in any country, which will enable properly controlled experiments to be carried out on sufficiently large groups of cattle to give statistically valid results. Because of the slowness of the work, however, there is little prospect of a speedy solution of the problem.

### *Soil tilth and plant populations*

The final session was concerned with "Soil Tilth and Plant Populations". Mr. J. C. HAWKINS (National Institute of Agricultural Engineering) stressed that the plough is still the cheapest and most effective method of controlling weeds, if it is used in the right way and at the right time for the particular conditions.

Looking at the future and to the day when it may be possible to control all weeds by chemical means, he said it would then be necessary to think again about ploughing and cultivations, starting from first principles. In the meantime, however, existing ploughs are still based on the horse plough, and we should study their design and action in relation to the power and speed of present-day tractors.

At the same time there is a need for much more information on means of measuring the quality of tilth. A number of experiments are being carried out at Silsoe to study soil-air relationships, and particularly the amount of oxygen required by both plants and soil for normal growth. Results so far indicate that soil micro-organisms need as much oxygen in the soil as the mature crop. The importance of root penetration in the soil was also discussed, and Mr. Hawkins quoted an example of how the free movement of air, water, and perhaps of the root as well, can be hindered when pneumatic-tired tractors are used for ploughing with wheels in the furrow, even though no damage may be apparent on the surface.

### *Plant populations and crop yields*

Mr. R. HOLLIDAY (Leeds University) in a paper on "Studies on Plant Populations in Relation to Crop Yield", gave a comprehensive review of work being carried out on this subject at Leeds and elsewhere over a wide variety of crops. A number of crops have given similar types of response curves in terms of plant populations and yield of reproductive growth (seeds), although they have not always been symmetrical around the same point of inversion. In the case of yields of vegetative growth (straw, grass, clover), however, different population-yield response curves have been found, and it is suggested that such curves are of two distinct types—a parabolic form in the case of reproductive growth and an asymptotic\* form in the case of vegetative growth.

Mr. Holliday believes that recognition of these two forms of curve is of fundamental importance in agronomic work, and that the reasons for such differences provide material for future study. Growth analysis studies suggest that high populations develop a complete leaf cover earlier in the growing season, and so make more efficient use of the total light energy available for photosynthesis. Work at Leeds shows that this curve can be represented mathematically.

Dr. R. S. EDWARDS (University College of Wales) dealt with specific experiments concerning "Tilths and Plant Population". He described briefly a machine which can separate the soil into various size fractions. It prepared

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\* An asymptote is the mathematical term for a line that continually approaches nearer to a given curve without ever meeting it.

a range of tilth conditions under which the following studies were carried out:

- (a) The number of plants (winter oats and spring barley) which emerge per 100 seeds sown.
- (b) The overwinter survival of autumn-sown oats, with special reference to the importance of frost heaving of the soil as a cause of plant mortality.

More plants emerged from fine seedbeds than from coarse ones, but the differences, though significant, were generally small—about 10 per cent. Sufficient plants emerged on coarse seedbeds to give a full stand. The difference in *speed* of emergence was greater and was in favour of fine seedbeds.

Winter oats were found to be much more susceptible to killing by frost heaving when sown late (September sowing is best), and when sown on fine seedbeds. Losses through frost heaving and damage are particularly important in some seasons, and Dr. Edwards is following up this work, using methods which he has devised that are applicable to large-scale experimental use.

The success of the meeting at York was in no small measure due to the active interest and co-operation of numerous people and agricultural organizations in that part of the country.

## Foot-and-Mouth Disease in South America

J. N. RITCHIE, C.B., B.SC., F.R.C.V.S., D.V.S.M., F.R.S.E.

*Chief Veterinary Officer, Ministry of Agriculture, Fisheries and Food*

An organized and widespread use of vaccination and other control measures are needed to prepare the way for the eradication of foot-and-mouth from South America. In so large an area, parts of which are highly infected, the problems are immense, but they are being firmly tackled under the auspices of the Pan American Foot-and-Mouth Disease Centre at Rio de Janeiro.

THE Bledisloe Agreement, made in 1928 between Great Britain on the one hand and Argentina, Brazil and Uruguay on the other, was designed to reduce the risk of transferring foot-and-mouth disease infection in carcass meat and offal imported from South America. It covers the certification of the health of the animals being moved to frigorificos\* and of the animals on the farms from which they are to be moved, it deals with the disinfection of trucks for transporting the animals, and arranges for their inspection *en route* and in the markets to which they are consigned. This applies also to herds of animals moved on the hoof. No beasts from any batch containing an infected animal will be slaughtered for export. All packing and wrappings of meat for export must be entirely new.

\* Frigorifico—a combination of slaughter-house, packing, freezing and storage plant.

These arrangements were made by the South American countries when it was appreciated that frozen or chilled meat and offals were a likely method of conveying the virus of foot-and-mouth disease over long distances. In Britain the precautions include the destruction of meat wrappings and the sterilization of waste food by boiling before it is used as food for animals. Useful reports are received regularly from the British veterinary staff resident in South America, but it was a great privilege to be able to visit several South American countries last year under the auspices of F.A.O. and see the conditions under which beef is produced and processed for export.

### *Vaccination the first step to control*

In the main beef-producing countries, the sort of meticulous disease-control measures used in this country are impracticable. In the first place, the properties are usually very large, and the cattle are maintained under ranching conditions. The co-operation of the herd owners is not so readily obtained, and the veterinary and other staffs available for disease control are very few in proportion to the livestock population. For example, in the Argentine there are 44 million cattle, 45 million sheep, 5 million goats and 4 million pigs, but only two thousand veterinarians in the country, who have to cover 1,100,000 square miles; furthermore, the terrain is often difficult and stock may be inaccessible at certain times of the year. Foot-and-mouth disease is endemic in most of the countries and the only possible method of control is vaccination. While it is true that other methods, particularly controlling movement of stock, must also be used to ensure eventual eradication, these other methods need not be in full use at the early stages. Even if the amount of vaccine available is insufficient to inoculate all the stock, a useful start can be made if the supply is used to best advantage; for instance, in a heavily infected area or a heavily stocked breeding locality.

In the South American countries the farm staffs would obviously have to carry out vaccinations. It is only by the organized and widespread use of vaccine that the disease will eventually be brought under sufficient control to be eradicable by other means, which will include the slaughter of affected animals in the final stages, movement controls of increasing severity, the effective disinfection of premises and the disposal of infected matter.

In most of South America there is a lively appreciation of the need for more extensive and more systematic use of vaccine. During my visits to Government and other laboratories, I paid a considerable amount of attention to the methods and extent of vaccine production in the different countries. At the same time I tried to assess the various means by which the efficacy and safety of the vaccines were being tested. It was encouraging to find high-quality research being carried out with more recent production methods, including the propagation of virus in cultures of tissue cells in sufficient quantities for use in vaccine production, and the attenuation of the virus by passage through rabbits. Vaccine prepared by the latter method is of particular interest because it gives promise of a longer-lasting immunity.

This is of immense potential value where large numbers of cattle are kept because, if the immunity persists for at least a year, it may be necessary to vaccinate steers once only. It may be that a vaccine will give greater protection when the reduction of virulence of the virus is such that a minor lesion

of foot-and-mouth disease develops in the vaccinated animal. It would obviously be most unsatisfactory to tolerate the use of such a vaccine in a country where little disease was present, but it would be a small price to pay for a long-lasting immunity in countries where infection is widespread, and the main problem is to get sufficient vaccination carried out.

It is clearly a very long-term project to contemplate elimination of foot-and-mouth disease from most of the South American countries. Regulations which require vaccination of all animals before they are moved from their farm of origin, wherever they may be going, would have a beneficial effect and would greatly assist in the shorter term to control the risk associated with our meat supplies. Such a regulation applied at one time in the province of Buenos Aires, and I understand that it may be re-applied in the whole of Argentina. This would be most helpful.

### *Foot-and-mouth disease centre*

International collaboration has long been recognized as the key to the prevention or to the control and eradication of foot-and-mouth. This was one of the main reasons for the establishment in Rio de Janeiro of the Pan American Foot-and-Mouth Disease Centre, which has rendered valuable service in connection with research on vaccines and in providing refresher courses for veterinary surgeons, is highly regarded in the various countries, and can be of tremendous influence in guiding their control measures.

The Centre's first task after its establishment in 1951 was to study the complexities of foot-and-mouth disease and its control in the Americas, to provide a sound basis for planning. These studies revealed that the countries should be separated into three groups, each requiring a different approach: those which were free of the disease, those which were only recently or partially infected, and those in which the disease had been firmly established for many years.

For the first group, which comprises the countries of North and Central America, Panama and the islands of the Caribbean, the Centre's programme has been to work with national authorities in co-operation with FAO and (in Central America) the *Organismo Internacional Regional de Sanidad Agropecuaria* (OIRSA), to strengthen preventive measures against the introduction of the disease.

In the second group, which includes Colombia, Venezuela, Ecuador and Peru, the Centre's aim has been to help governments to turn their national programme towards eradicating the disease and to facilitate collaboration between neighbouring countries. The final objective of eradication will not be attained easily, but it is possible with existing methods, provided the necessary resources are made available. Once free of the disease, this group of countries could remain free.

The third group, Argentina, Bolivia, Chile, Paraguay and Uruguay, presents more complex problems. In all these countries foot-and-mouth disease is so widespread that improved methods of diagnosis and services, a vaccine which gives stronger and longer lasting immunity, and greatly expanded veterinary services are needed before an eradication programme can be introduced. The Centre has, therefore, devoted a large part of its resources to developing the new tools which are required, and encouraging progress has



been made. It will be some time, however, before new methods will be available for general use. In the meantime, through training courses and advisory services, the Centre's aim will continue to be to secure the best possible use of existing control methods and prepare the way for future developments.

But the basic approach to the problem in South America, and particularly in the group of countries where the disease is endemic, is the same as that in Europe. Vaccination is to be used to bring the disease sufficiently under control to permit the adoption of a stamping-out policy. In those countries where a heavy weight of infection is present, or where there is a continued threat of infection, the policy should be systematic vaccination. The system may be varied to suit the circumstances in the particular country: it may be possible, for example, to adopt annual vaccination of all cattle stock, or vaccination may be done around centres of infection, or in threatened areas. When the number of outbreaks has been sufficiently reduced, vaccination may be supplemented by slaughter of animals on infected premises. Later, there may be a reduction in routine vaccination and the stamping-out policy may be adopted as the main method of control. This stage may not be reached in a particular country until its neighbours and countries from which imports, particularly of livestock, are made, have reached a similar position. Only after this will it be possible to rely entirely on stamping out.

It is obvious that there must be sufficient supplies of trustworthy vaccines, and a staff capable of organizing and carrying out the vaccination. It must be emphasized that, whatever the policy, it is essential to control the movement of stock, to dispose of infected material and carry out effective disinfection.

### *Frigorifico practice*

We cannot expect that it will ever be completely safe to import frozen or chilled meat and meat products from a country in which foot-and-mouth disease is endemic. In the short term, therefore, various expedients must be applied to reduce the risk as far as possible. The main points which must be given attention are those provided for in the Bledisloe Agreement. The most important is that the frigorificos should be under such good management that any infection reaching them is faithfully dealt with by those in charge.

An example of the sort of situation which carries tremendous danger was seen at one frigorifico from which, however, material was not being produced for export. In this case infected animals are taken from a market and placed in an isolation compound which is merely a series of pens separated from the remainder of the holding pens by a solid 8-foot wall. No precautions appear to be taken to prevent access to the isolation unit, nor to control the movements or see to the disinfection of anyone who has visited it. Other possible indirect means of conveying infection are completely ignored.

Normally, animals are not held in lairages for long periods, but they may be there for up to forty-eight hours. The affected beasts are expected to be slaughtered at the end of a day's kill, but when I saw affected cattle there this arrangement was not being followed. The three batches concerned were being held until the end of the next day's kill which, presumably, would allow for a degree of recovery in the already obviously affected animals but would, at the same time, bring the others nearer to the time when frank



lesions of disease would appear. Meanwhile there seemed to be opportunities for animals going through the lairage to pick up infection and possibly for the virus to multiply before the time of slaughter, as well as opportunities for a variety of materials to become contaminated.

In contrast to this, frigorificos were visited in which no disease had been present for several years, apparently owing to caution in buying animals for slaughter. Practically no animals were brought from markets: nearly all were moved directly from the ranches of regular customers.

As a result of the visits, a number of recommendations about future developments in South America were made to F.A.O. They have been considered and endorsed by the European Commission for the Control of Foot-and-Mouth Disease. The subject is also expected to receive attention at the next F.A.O. conference, whose resolutions may well give effect to certain of the proposals made.

## Sheep in North Cardiganshire

IEUAN MORGAN, B.SC.

*Llandre, Cardiganshire*

*I will lift up mine eyes unto the hills, from whence cometh my help.*

MOST farmers in this part of North Cardiganshire will echo the words of the psalmist, for although most of them gain part of their livelihood from store cattle and milk, in the main their fortunes are bound up with mountains and sheep.

Those in love with the sea will no doubt know of the scenic beauty of this part of the Cambrian coast, where the flat expanse of the Borth bog contrasts so strikingly with the surrounding hills; hills that by the sea give rise to a pleasant and fertile countryside, but gain height as they march inland, until, after some five or six miles, they become part of the Plynlymon range and achieve the stature of mountains. These are not crowned with rugged peaks as in some other parts of Britain, but are moderate in height with gentle contours.

The sheep farming tradition in this part of the world is said to reach back at least to the days of the monasteries, and although the days when people were required by law to be buried in a woollen shroud are long since past, our village of Talybont can still boast two active woollen mills. There are few visible relics of the old-time husbandry, except perhaps for the stone-walled pens on the sides of the mountain, where it was said sheep had milk drawn from them to be made into cheese.

The integration of mountain and lowland is really based on the fact that while the upland grazings will give good sustenance to sheep for much of the year, when the mountain slopes are browned by chill autumn and winter winds, then it is advisable to bring the greater part of the flock down to the

more fertile and sheltered lowlands. Sometimes, by casual remarks about dog-and-stick farming, we are made aware that it is not everyone who has a high regard for sheep farming. But more worthy of consideration is the opinion expressed by certain economic experts that the rate of capital turnover is low.

### *Mountain and lowland complement each other*

Why is it, then, that among the large number of farms of all kinds and sizes in this area there are so few that do not have sheep grazing on them for at least some part of the year? The wetness of the climate and the nature of the soil are against some types of farming, but I think that the widespread popularity of sheep is really due to the fact that they can, by following certain methods of husbandry, be combined with other lines of production such as raising store cattle and selling milk. The low labour requirements of sheep make this possible, but an even more important factor is the access of the lowland farms to the extensive upland grazings.

What we call lowland farms begin at the foot of the mountains, and these often have a "ffridd" at the back of the farm running up to a sheep walk. Farms lower down are not so fortunate, and if they have a sheep walk they may be separated from it by as much as eight or nine miles. In such cases moving the flock may mean five to seven hours on the road, and it is a good test of patience and sound feet. Sheep walks vary in size from a few hundred to thousands of acres. But one acre of lowland is usually worth about six acres of mountain. Sheep flocks also vary in size, of course—anything from fifty to two thousand ewes. Very often the owners of large sheep walks allow smaller flocks to agist with them in return for a small charge or help with labour at peak periods.

Basically, the management of the large and the small flocks is the same, but the small owner is usually able to give more attention to the finer points, and his sheep tend to be of more even quality and his losses are lower. In both cases it is axiomatic that the home of the breeding flock is on the mountain and it is only allowed to make great demands on the lowland farm during winter. This then allows the period of greatest growth to be available for the grazing of cattle and the growing of winter forage crops for them.

Like most parts of Britain, our district has many small farms, and to these the mountains are of special value. Many are no bigger than fifty or sixty acres and are often on poor soil and far from main roads. They therefore do not have a very big cattle-carrying capacity and are inconveniently placed for intensive milk production. They may be unable to keep more than twenty or thirty cattle at the most, but by keeping a hill flock they are able to double their business enterprise. Although the majority of them do not have grazings of their own, they are able to agist their flocks on the larger sheep walks. Thus we have many instances of small farms having flocks of from one hundred and fifty to two hundred ewes. The main part of the flock is on the home farm only from January to May, a period in which the cattle would in any case have to be kept indoors. Thus the sheep are not a great limitation on the cattle-carrying capacity of the farm. But in these cases the question of whether a mountain flock can be kept or not often decides whether a holding can be made to support a man and his family.

In this direction there is room for concern, for the acquisition of large areas of sheep walk for afforestation will deprive these small farms of this possibility. As many of the places described are adjacent to the mountains, there is a danger that the area of total depopulation will be enlarged as planting proceeds and these small farms become uneconomic. The present inhabitants are unlikely to be replaced by forestry workers, for the latter show a marked preference for living in the village.

To give the geographical position of our sheep walk, I can do no better than to say that if someone were to stand on the top of Plynlimon, the highest peak in Cardiganshire, and turn westwards, he could gaze down and see it almost in its entirety. It is just plain mountain with few unusual features. On the adjoining mountain of Hyddgen there was once a famous battle between Owen Glendower and the Flemings of Pembrokeshire. Ever since, as far as my knowledge goes, the theme has always been one of sheep and solitude. Now, however, man is claiming his place in the panorama by building a large lake, part of the Rheidol Hydro-electric Scheme. This will submerge a little of our land and form part of our eastern boundary.

### *Hill flocks at Talybont*

Management of the hill flocks at Talybont is roughly similar to that in most of the hill areas of Wales. The ewe lambs are brought down in October and usually sent away to winter at other lowland farms. Most flock-owners have found that when these are kept at home among the breeding flock they do not thrive. Many farmers in the district have found the wintering of ewe lambs an easy method of paying their rents. These lambs are sent back to the mountain in early April so that they do not take too heavy a toll of the early grass. For wintering, dry farms near the sea and with a southern aspect are preferred. This is an instance of how farms with no hill flocks are still able to benefit from the presence of the mountains.

The yearling ewes are brought down to the lowland farm in December and the older ewes in January. Some of the strongest ewes, perhaps amounting to a quarter of the flock, are left to lamb on the mountain. Although they receive almost no supervision, unless they are overwhelmed by an unusually heavy blizzard, they do quite well. For whereas during the summer our sheep walks would hold some two to three sheep to the acre, each sheep will now have two to three acres to itself. This practice is followed only by the larger flocks. Under these rigorous mountain conditions it is an advantage that lambs are born with a thick coat of wool.

The ewes brought down to the lowland can be packed at the rate of three or four to the acre. After grazing the tough wiry grasses of the mountain, they find even the shortest lowland grass most appetizing. Although formerly this was not necessary in this district, measures have now to be taken to safeguard the lambs against dysentery. But this is still not necessary with lambs born on the mountain.

The rams have been controlled so that the ewes lamb towards the end of March to the beginning of April. A lambing percentage of anything over eighty is considered satisfactory for a hill flock.

In mid-April any barren ewes and the rams are sorted out and sent back

to the mountain, thus giving a little more room to the ewes and lambs. These usually make their annual migration in early May, a time often welcomed by the farmer with some relief if he is in a hurry to turn out his cattle. But an extra week's grace will often make a considerable difference to the final condition of the lambs.

On our farm we castrate the male lambs by the New Zealand rubber ring method, before sending them to the mountain. The male lambs born on the mountain are castrated in June when the ewes are crutched, but as there is usually very little maggot trouble on the sheep walks, the latter task is often neglected. Indeed, it is surprising how free mountain sheep really are from disease and parasites.

Shearing in this part of the world is still done on a communal basis and mostly by hand shears. The Welsh ewe gives some 2-3 lb of wool, which contains a certain amount of red and white kemp. Red kemp is greatly frowned upon by the wool grader, and there is some disagreement as to whether it is a sign of hardiness. Its proportion in the wool is increasing, but it has not been proved that sheep with red kemp have a better survival value.

Dipping is in August, and many flock-owners take the opportunity of that gathering to pick out the wether lambs. These are fattened at home on rape or sold for fattening to other farmers. They fatten more easily if dosed twice with phenothiazine and implanted with hormones. Lambs brought down early like this are often greatly troubled with foot rot, for which I have not yet seen a very satisfactory cure. These wether lambs come out fat towards the end of the year and, it is believed, clash to some extent with imports from New Zealand, with a consequent depression in prices.

It is probably the demand by lowland farmers for draft ewes which has enabled the survival of sheep farming as we know it.

### *Mountain health and hardiness*

When ewes are kept for successive years under lowland conditions, two troubles may occur. They may become too fat during the summer and therefore unable to breed, or if the land is a little wet, as it often is, they may become infested with fluke. Because of this, farmers have found it best to replace their breeding ewes every year with fresh ewes from the hill flocks.

The climate of the mountains and the nature of their herbage are such that a sheep must be active, hardy and a good forager if it is to survive. Indeed, it is the very rigour of these upland conditions which enables them to produce ewes so suited to the purpose of the lowland farmers. For when such ewes are put on the fertile lowland in the autumn they are much stimulated, and take readily to the ram.

Welsh mountain lambs will seldom give a carcass of much over thirty pounds. But the Welsh ewe is very milky, and when crossed with a Down type ram under good lowland conditions will easily rear her lamb to give a carcass of thirty-five to forty pounds. Because of the rapid liveweight gain of their lambs the Suffolk cross has become the most favoured, but for quality of carcass I do not think it will equal that from the Southdown. To avoid losses at lambing time, be careful when choosing the ram for crossing. He should be pure bred, and have rather a fine head and not too bulky shoulders.

The Welsh Half-bred is an attempt to overcome the small size of the Welsh ewe. The latter is crossed with a Border Leicester or a Kerry Hill, and the ewe lambs are kept on for breeding. They are bigger than their mothers, and some will give lambs in their first year and a good proportion of twins in subsequent years.

## Armillaria Root Disease in Orchards

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This fungus disease can be troublesome among trees planted wherever other trees have been felled. Dr. Garrett shows how to recognize it, and describes five ways of limiting the harm it can do.

ARMILLARIA root disease, caused by the fungus *Armillaria mellea* (Fr.) Quél., is not a major problem to the fruit-growing industry in this country. Nevertheless, every year it takes an appreciable toll of fruit trees, bush fruits and other plantation crops, and much of this loss could be avoided. The control methods discussed in this article are based on well-tried methods for dealing with this and similar root diseases in tropical plantation crops such as tea and rubber. Some modifications have been made, however, in the light of recent experiments and field observations conducted in this country.

### Diagnosis in the field

Growers should be on the look-out for *Armillaria* root disease in a young plantation established on the site either of cleared woodland or of an old orchard or other plantation. It appears after the felling of individual standing trees in hedgerows, etc., when the roots of such trees may be near those of the plantation.

Under such circumstances, the grower should keep a sharp look-out for signs of backward growth and general unthriftiness in his young plantation. If they are seen, the collar and upper part of the roots of a suspected tree should be bared of soil, and an oblique cut made through the bark to the wood. If *Armillaria* is present, a dense white growth of the fungus can be found between the bark and the wood and interleaving the layers of the bark. This white growth is exactly of the consistency shown by the underside of the skin of a mushroom peeled for cooking, and is the most reliable indication of the presence of *Armillaria*. Sometimes a growth of the black "boot-laces" (rhizomorphs) of the fungus can be seen, either on the surface of the roots or spreading through the soil. The absence of visible rhizomorphs, however, does not prove the absence of *Armillaria*; rhizomorphs are usually present at some stage of disease development but are easily seen only when fresh and abundant, and even then are easily mistaken for rootlets, as their



name indeed implies. Lastly, in the late stages of attack upon an individual tree, *Armillaria* often produces a crop of brownish or fawn-coloured toadstools round the collar; these can be identified with certainty only by a competent mycologist.

## *Life cycle in the soil*

*Armillaria* is present in most woodland soils and also in the soil of many old orchards. Its root-like black rhizomorphs can be found coursing through the earth, covering the roots of trees and causing a limited amount of actual root disease. Excessive development of the disease is prevented by the natural resistance of mature trees growing under good conditions, and so the presence of *Armillaria* is often quite unsuspected. When trees are felled for clearing, the resistance of the stump roots to infection is sharply lowered by this unnatural separation from the top of the tree, and then *Armillaria* starts to infect them and spread quickly in both directions. In this way, the length of infected stump roots lying in the soil increases rapidly. Even when stumps or whole trees are grubbed with some length of their main roots, the outlying parts of the roots are left behind in the soil, and along these *Armillaria* continues to spread unchecked. Such lengths of infected root are a serious menace to any young plantation crop established on the site.

After one of these weakened but still living roots has been occupied and exploited by *Armillaria*, the fungus eventually produces a crop of rhizomorphs which grow out through the soil in all directions. If the rhizomorphs encounter susceptible living roots not too far away, they infect them; dead wood not yet completely occupied by saprophytes (decay fungi) can also be colonized by the fungus. But if the rhizomorphs can find no suitable living roots or dead wood to occupy, they grow on till the reserves in their "food base" (a length of old, diseased root) are exhausted, and then die of starvation. This is a weak link in the life cycle of the fungus and can be exploited for its control. In the absence of suitable roots or woody material on which to grow, *Armillaria* will eventually exhaust itself by producing a crop of rhizomorphs. More specialized root disease fungi do not exhaust themselves thus; they produce rhizomorphs only when a susceptible tree root makes contact with them in its growth through the soil, and so they are able to conserve their food reserves for a long wait if necessary. Such fungi are more difficult to control than *Armillaria*.

## *Cleaning the soil after clearing*

Three methods of reducing the amount of infected roots left behind in the soil after clearing are available; they can be used either individually or in combination, as circumstances dictate. Each one of them, if practicable and if efficiently carried out, will help to reduce subsequent losses from *Armillaria*.

Obviously, the more of the main root system that can be removed from the soil when a tree or stump is grubbed, the smaller will be the risk of infection from pieces of diseased root left behind.

Ring-barking before felling was developed by R. Leach<sup>1, 2</sup> in Nyasaland some twenty years ago, as a method of controlling *Armillaria* root disease in



young tea plantations established on the site of felled jungle. Leach observed that if trees were ring-barked a year or more before felling, trouble from *Armillaria* in the young tea was much reduced. He showed that this was due to rapid killing of the roots as a result of ring-barking. The more quickly a root can be killed, the more quickly will it be entered by harmless decay fungi. Once such decay fungi have thoroughly occupied a root, it can no longer offer food and shelter to *Armillaria*.

If a tree is properly ring-barked, the flow of food material, manufactured in the leaves, down through the bark to the roots is arrested at the ring. But the crown of the tree continues to draw water for its leaves up through the wood from the roots. The roots are thus kept at work, but are denied the food material that normally comes down to them through the bark. They are compelled to draw upon their own starch reserves; and when these are exhausted they die. In contrast, the stump roots of a felled tree no longer have to supply the crown of the tree with water and nutrient salts from the soil, and are able to conserve their starch reserves and remain alive for a long time—and so for a long time *Armillaria* can continue to spread along them.

Ring-barking is most effective if carried out immediately after the tree has come into full leaf. A complete ring of bark, 6-9 inches wide, should be removed—just down to the wood but no further. Care should be taken not to cut into the wood, because this will interrupt the upward flow of water which is essential for success of the method. For the same reason, the ring of bark removed should not be wider than about 9 inches, as this could lead to drying-out of the surface layer of wood that is most active in transport of water. Protection of the ring by polythene sheeting would prevent this and can be recommended. Ring-barking is not practicable for scrub woodland, nor for areas occupied mainly by bushes.

A break under annual field crops between clearing and planting can be guaranteed to starve out much of the *Armillaria* in infected roots left behind in the soil after clearing. It is most effective if all the larger roots can be taken out when the land is cleared and stumps are grubbed, as the fungus lasts longer in larger roots. Soil cultivation incidental to preparing the land for a crop and for weed control will encourage *Armillaria* to produce crops of rhizomorphs, many of which will be destroyed by severance from their food base in subsequent cultivations. In this way, the fungus can be induced to exhaust itself. *Armillaria* can infect potato tubers, which become filled with a white mass of the fungus, and may be covered on the outside with the black rhizomorphs. Occasional tubers thus infected that are left behind in the soil at lifting time will not greatly help to prolong the life of the fungus in the soil; and a potato crop can usefully show how much root material with living *Armillaria* is still present in the soil down to the lowest tuber depth.

### *Clearing infection from the ground after planting*

Residual sources of infection remaining in the soil after planting can be dealt with in the following way. The growing trees are allowed to discover infected roots remaining as sources of infection, which must then be dug out and destroyed. Admittedly some digging has to be done, but only the

essential minimum; potential sources of infection that never succeed in making contact with the roots of the young plantation are harmless and can safely be left alone.

On any site where, from its past history, there is reason to suspect the presence of *Armillaria*, a close and regular watch must be kept on the growing trees. As soon as a tree shows any sign of backward or unthrifty growth by comparison with the others, then the collar and upper part of the root system should be bared of soil and closely inspected for signs of the white fungal growth (mycelium) between bark and wood, and possibly the presence of rhizomorphs as well. If *Armillaria* is found, then the infection must be traced backwards and downwards along the root until the source of infection—a length of old infected root—is reached. *This must be completely dug out and destroyed.* The infected part of the living root must then be cut away and also destroyed. This procedure must be followed for every root that is found to be infected. If infection has reached the collar of the young tree, it will be safest to remove the tree completely with the whole of its root system, and also the buried source(s) of the original infection. If this is properly done, it should be safe to replant the gap, provided that a close watch is kept on the young growth.

This method was originally introduced by R. P. N. Napper<sup>3,4</sup> at the Rubber Research Institute of Malaya nearly thirty years ago, and its value has been thoroughly attested by subsequent practice on rubber estates. As originally introduced by Napper, the method was even more thorough than that recommended above. Instead of waiting for trees to reveal root infection by unthrifty growth, an attempt was made to forestall root disease by inspecting every young tree in the plantation every 4-6 months for the first few years. At each inspection, the collar and upper part of the root system were bared of soil and searched for signs of root disease.

If, after the site for a future plantation has been cleared, it seems likely that there are still too many infected roots in the soil to make the immediate planting of young trees at all safe, then there is an alternative procedure that has been followed by some growers and can be strongly recommended. This is to plant a crop of bush fruit, such as black currants, gooseberries or strawberries. The bushes are used to indicate buried sources of infection through the backward and unthrifty growth of those individuals that make contact with *Armillaria*. The procedure outlined above for discovery and removal of each buried source of infection, together with living infected roots or whole bushes if necessary, is then followed. The advantages of this are: that as bushes are planted closer than young trees, the soil will be more quickly and thoroughly explored by the roots; that buried sources of infection can be discovered and dealt with both earlier and better; and that bushes are more expendable than young trees. If this control procedure is properly followed with the bush crop as a forerunner, then in due course a tree plantation can be established in reasonable confidence that most of the *Armillaria* has been discovered and destroyed.

### *Are all these precautions really necessary?*

All the control measures described above can be guaranteed to reduce potential losses from *Armillaria* in a young plantation. But the grower will

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naturally ask whether it is necessary to take all of them. No categorical answer can be given to this question, because so much depends upon the amount of *Armillaria* under the original stand of trees before clearing, and upon the particular soil and situation. *Armillaria* is more active in some soils than in others; unfortunately, it seems to be most active in the soils best suited for tree growth. But conditions for rapid and healthy growth of trees also shorten the dangerous period in which a young plantation is most susceptible to attack by *Armillaria*. This being so, both local knowledge and expert advice are equally necessary in correctly assessing the situation on any particular site, and the grower should consult the National Agricultural Advisory Service as to which particular control measures (among those listed here) he should adopt. One thing alone is certain—prompt and full action in the early stages of any planting venture will pay for itself many times over.

I am most grateful to Dr. J. E. Crosse, of East Malling Research Station, and to Dr. J. Rishbeth and Dr. N. F. Robertson, of the Botany School, Cambridge, who have read and criticized the manuscript.

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### ★ NEXT MONTH ★

*Some articles of outstanding interest*

SIXTY YEARS OF SAXMUNDHAM by Sir John Russell

PRINCIPLES OF GLASSHOUSE HEATING by L. G. Morris

SHEEP RECORDING AT THE DORSET FARM INSTITUTE by H. F. Fieldsend

DRINKING HABITS OF GRAZING COWS by D. S. MacLusky

# Highbush Blueberries

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and

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Blueberries are a well-established soft fruit in the U.S.A. What are the possibilities for them over here when propagating material has been built up?

THE fruits of several wild species of *Vaccinium*, including our own whortleberries or bilberries, *V. myrtillus*, have been used in this and other countries for many years, but only during the present century have the late Dr. F. V. Coville's investigations in the United States resulted in the development there of a considerable industry in cultivated blueberries.

Most of the experimental and improvement work in the U.S.A. has been done with the highbush type of blueberry, especially the northern species *V. corymbosum*. By selection of wild seedlings and subsequent hybridizing, the fruit quality and size have been greatly improved, and the production of highbush blueberries in America is increasing fast. The wild blueberry normally grows on very acid sandy or peaty soils with a pH in the region of 4-5. Soils of this type have usually been selected for commercial production of blueberries in America, though more recently less acid soils with a sawdust mulch have been planted. Blueberries respond to an adequate supply of soil moisture, but they need good drainage. The fine, fibrous roots cannot penetrate a compact, heavy soil. A good supply of organic matter appears to be essential, particularly on light, sandy soils. The highbush blueberry forms a bush rather like a black currant, though varieties differ, some being erect and others drooping. The bushes do not reach full production until about six or eight years old, but they are reputed to be very long lived; some in the U.S.A. are probably over 100 years old.

## *Trials in Dorset*

Although a few highbush blueberry varieties were introduced into this country before 1939, there has been little attempt to establish the crop commercially until recently. Plants for this purpose have been imported from the U.S.A. and Canada.

To study the possibility of growing blueberries on the Bagshot Sands, two-year-old bushes of a number of varieties were planted in 1953-54, on land kindly lent by the Forestry Commission, at Sugar Hill near Bere Regis. The varieties included those which in the past have proved most successful in the U.S.A.—Burlington, Concord, Jersey, Pemberton, Pioneer, Rancocas, Rubel and Stanley, together with Fraser and Johnston from Canada. In 1957-58

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some of the newer American hybrids, Berkeley, Bluecrop, Blueray, Coville, Earliblue, Herbert and Ivanhoe were added, with Dixi, an older variety, GN 87 from Canada and two German varieties, Goldtraube and Zuckertraube. The bushes were planted  $3\frac{1}{2} \times 8$  feet, but for commercial purposes  $6 \times 8$ – $10$  feet is more usual, or  $4 \times 8$ – $10$  feet if alternate bushes are removed when necessary to prevent overcrowding.

The soil at Sugar Hill is a peaty sand with a pH of 4.7 to 5.1. The site was originally covered with heather, which was cleared and the ground rotovated twice before the bushes were planted in mid-March. Chopped bracken compost was mixed with the soil and subsequently used as a mulch, but neither this nor deep-litter poultry manure seems as successful as the sawdust which is now being used. Work in the U.S.A. has shown that blueberries respond particularly well to a mulch of sawdust, which may be composted with poultry manure, or have sulphate of ammonia added, to help break it down before application. On the low-fertility heathlands where blueberries may be grown, mulching helps to hold water in the soil and, with annual dressings of nitrogen, is necessary to ensure a constant supply of new growth; as with the black currant, the bulk of the crop is carried on second-year wood.

Blueberry bushes grow relatively slowly for the first year or so after planting unless conditions are particularly favourable. Pruning is designed to cut out unproductive old fruiting wood and to encourage the growth of new shoots from the base of the bushes. The fruit is borne on the last few inches of these shoots and on laterals growing out from older wood. At Sugar Hill, the old, twiggy, fruiting wood is pruned out, and some thinning out of the weaker laterals is done. Reducing the length of shoots bearing numerous fruit buds helps to keep the berries a good size; the retention of older wood produces smaller berries with increased yield and lengthening of the picking season. The system of pruning will depend on the vigour and variety of the bushes, and the time the fruit is most in demand.

Birds have proved very troublesome in eating the ripening berries and have so far been the only pest in this country, though two diseases, *Phomopsis* and *Botrytis*, have caused dieback. A captan spray before leaf fall has controlled *Botrytis* satisfactorily.

### Varieties

In the United States the newer hybrid varieties are proving superior to the older standard ones such as Pioneer and Rubel, though they all vary in their performance according to the State in which they are grown. Choice of varieties for this country will probably depend on the area in which they are to be grown. In the south of England all the varieties under trial have ripened satisfactorily, but they may or may not do so when grown farther north.

In Dorset, Fraser and Pioneer have produced low or weak growth and, like Rancocas, do not seem promising, while the fruit of Rubel is late, small and acid. Concord and Johnston are prolific, with large well-flavoured berries, though Johnston is subject to mould in wet weather. Burlington, Jersey, Pemberton and Stanley have so far been the most promising of the older varieties. Burlington has ripened early, about the same time as Stanley and relatively earlier than in the U.S.A. Pemberton ripens late and rather unevenly, but is a vigorous grower and has a good flavour. Jersey is also a



late, heavy-cropping variety and has made a rather slender bush with small berries.

The newer kinds have not yet been grown long enough to give full crops, but so far Earliblue has appeared a very promising early variety. Berkeley is of fine flavour and is ripe in mid-season, at the same time as Dixi. Herbert and Coville are both late. GN 87 has grown well and produces large berries, but Goldtraube has not been outstanding and Zuckertraube appears useless.

Time of ripening has varied from year to year by several weeks but, in an average season, early varieties should be ready in Dorset during the third week in July, mid-season sorts from the end of July to early August, and late varieties towards the end of the second week in August. Three pickings are necessary for most varieties, but the best fruit has come from first pickings from younger wood. The most vigorous bushes have each yielded 10 lb of fruit in their sixth year, equal to about four tons an acre from a 6×8-foot plant. The crop should increase as the bushes become larger, so that yields should equal or exceed those from black currants.

The fruits of blueberries have very small seeds, and while they can be quite refreshing, they are not of outstanding flavour and are probably eaten raw only by children or those with unsophisticated palates. Their chief use is when stewed or made into pies. They bottle and can well, and are also suitable for deep freezing and preserving as jam. Prepared in the right way, they have an excellent flavour.

### Propagation

Blueberries set seed freely, but plants raised in this way, like most fruits, do not breed true. Propagation by hardwood cuttings is the method normally used to increase stocks of named varieties, but careful attention is required if a good take is to be obtained. In trials carried out at Bristol, cuttings were made from well-ripened shoots of the previous year's growth, taken from the bushes about mid-March, just before bud-burst. The cuttings were about four or five inches long, wood bearing fruit-buds being discarded, and inserted 2×4 inches in a frame, in a mixture of three parts by volume of peat to one of sand. A comparison was made between the use of bottom heat of about 70°F, supplied by electric cable, and no heat.

Cuttings callus fairly readily and form top growth, but do not start to produce roots until about mid-June, so that careful watering and ventilation are needed during the early months. Both *Botrytis* and bacterial rots have caused losses in these trials. Rooting hormones are not of much value with blueberries, but once rooting starts an application of sulphate of ammonia— $\frac{1}{2}$  oz to the sq. yard—is helpful. Ventilation needs to be given freely at this time and the rooted cuttings hardened off, being left in the frame ready for planting out the following March. The use of bottom heat was found to produce a larger, better rooted plant, but it also encouraged more rotting than where no heat was used.

Propagation by soft wood cuttings under a mist unit has also been used. The new season's laterals are pulled off the bushes in June when about 4-7 inches long, before secondary growth starts and when the base of the cutting is firm but not woody. The cuttings root quickly, and are then potted up and hardened off slowly, being put in a cold frame for the winter. The pro-



portion rooting is variable but can be over 90 per cent, though losses often occur during autumn and winter.

Both hard and soft wood cuttings make plants suitable for lining out the following spring, but the hard wood ones are more robust and are ready for transplanting into their permanent quarters a year later without loss. About 60 per cent of the soft wood cuttings were found to need two years in nursery rows, and there were losses from those with poorly developed roots.

### *Possibilities of blueberry production*

Blueberries should not compete with other soft fruits: the best time for marketing is probably at the end of July and during August, when other soft fruits are off the market and the holiday season is in full swing. By selection of varieties and suitable pruning such a season of ripening could easily be obtained in the south of England, though ripening would be rather later farther north.

This crop appears to present fewer labour problems than many soft fruits and, so far, pest and disease control measures are very little trouble. Undoubtedly pests and diseases may appear as soon as the crop is grown on any scale commercially, and a spray programme may then be necessary. As mentioned previously, birds can cause serious loss of the ripe berries.

Marketing for the fresh fruit trade would be in half or one pound punnets. Properly pruned, any given variety will grow a uniform size of berry. The bloom is one of the great attractions of the fruit, so the less it is handled the better. The powdery blue surface with the black eye shows up best against pale green; the green of young blueberry leaves.

Many soft fruit growers will be interested in extending picking into July and August, but it will be a matter of further trial before it is known exactly what types of land will grow blueberries. At present, experience with the crop in England has been confined mostly to what are generally considered non-horticultural, acid soils of low fertility.

There is one quite practical reason why an appreciable acreage of blueberries cannot be planted in this country yet: there are very few bushes of planting age available and a very small amount of propagating material, although one or two commercial growers have now established small plantations. Will the supply of bushes come from the general or specialist nurserymen or from the growers themselves? There is no doubt that the price of the first bushes for sale will be high, because of pioneering difficulties in propagation. After buying his first quarter acre of bushes, the grower will probably try rooting his own cuttings. This was the original practice in America, though now there are specialist nurserymen.

The first few years during which this new crop is tried will offer plenty of scope for initiative and enterprise.

## The New Pennine Dairy Farming

W. PATTERSON, B.AGR.

*National Agricultural Advisory Service, Yorks and Lancs*

Helped by Government grants and advisory services, Pennine dairy farmers have overcome changed economic circumstances by making grass instead of bought concentrates the king-pin of their farming policy.

THE Pennine area of industrial East Lancashire and the West Riding of Yorkshire is probably the oldest centre of intensive milk production in the country. Here, 150 years ago, in the early days of the Industrial Revolution, the small farmers found a ready market for their milk from the rapidly growing population. Small fields were wrested from the moors, and cleared of stones, houses were built and gradually there emerged a patchwork of small farms. Milk production and retailing were often combined with weaving.

By comparison with most of the farming at that time, these little farms were quite profitable, especially as more and cheaper feedingstuffs arrived from the New World. They were heavily stocked, often at the rate of one cow per acre. The mowing fields were limed occasionally and received all the farmyard manure. Those fields which were too steep to mow were used as exercising grounds for the cows during the summer until the mowing fields were cut and cleared.

### *Changed situation*

This system served Pennine farmers well until the early days of World War II, when imported feedingstuffs became hard to get. Even then, milk production was the first priority for feedingstuffs, so that cow numbers and milk output were maintained.

But the situation changed in 1952, when feedingstuffs came off the ration and the subsidy was dropped. This coincided on many farms with giving up a retail milk round and starting to sell milk wholesale. Pennine farmers soon found that with their system of heavy feeding of concentrates, coupled with the lower prices they were getting for their milk, they were paying most of their milk cheque to the corn merchant. By 1954, university costings for the area showed that profits had dropped to an average of 8s. per acre, and some of this had come from pigs and poultry. Half the farmers were getting less than a farm worker's wage. It was obvious that only a revolution in production methods would save the situation, and farmers would have to rely less on cake and more on grass for their milk. Those farmers who, in 1940, put their grass into arable and have now forgotten the worries which it brought, may not realize just what such a change meant for these small Pennine farmers, most of them without tractors and with only moderate or poor grassland. It only made things more difficult if they used fertilizer because, in this high rainfall area, it is quite impossible to make heavy, lush grass into hay. They had to give up haymaking and go in for silage, with

experience only of disastrous attempts with small, round, tower silos during the war.

This situation was a challenge not only to the farmers, whose future seemed black, but also to the N.A.A.S. Previously, when a complete change of policy was needed to meet an entirely new situation, as in the 1890s and the 1930s, farmers were often brought to the edge of bankruptcy, or pushed over it, because they hadn't the necessary knowledge and confidence to go into something new. A big factor in helping farmers in the Pennines to change their system was the financial help given through the various Marginal Production Schemes. These primed the pump with new leys and kale crops for grazing, and small pit silos.

The financial results of the changes are shown by Leeds University costings as a rise in profits from 8s. per acre in 1954 to £9 16s. in 1957. This is due partly to more intensive production of eggs, but it is quite a staggering performance when viewed against a substantial increase in farm costs and reductions in the prices of milk, eggs and pigs—the main products of these farms.

### *New policy based on grass*

The results of the change in policy on just one Pennine farm furnish a good example. In 1955, Mr. A. Green of Holmside Farm, Holmfirth, Huddersfield, was following the traditional system of haymaking and fairly generous concentrate feeding of his dairy cows. His farm of 34 acres at 800 feet, with 60 inches of rainfall, is fairly typical of the area. During 1956 this farmer, with assistance under the Marginal Production Scheme, started using fertilizer on his grassland and making silage in a pit in a small way. His stocking was twelve cows, nine young stock and twenty ewes. His milk sales were 6,946 gallons, worth £1,050 at wholesale prices, and his fertilizer usage was 3 tons compound at a cost of about £60 net.\* He used 9½ tons of dairy cake, costing £332.

During 1958, fertilizer use had increased to 5 tons of compound and 8 tons "Nitro-Chalk" (cost £200). The cows had been increased to fifteen, the young stock reduced to four and the ewe flock increased to thirty. Milk sales were 11,345 gallons, worth £1,700. Twelve tons of concentrates, mostly cereals, were fed at a cost of £360. Hay had been replaced entirely by silage. With similar cows, the milk yield per cow had increased by 170 gallons, although concentrates fed per cow had been reduced. This was due to the better grass available for summer grazing, the provision of kale for autumn grazing and plenty of silage for winter use.

The farm is eligible for the Small Farmer Scheme, and because of the greatly increased productivity of the farm, the dairy herd is being increased to twenty this winter and forty ewes are being kept. New accommodation had to be provided for the extra cows and it was decided that it would be better and cheaper to build a new, covered silo, add a lean-to to the existing barn, and sleep the cows in these two houses, allowing them to self-feed and using the existing cowshed partly as a collecting yard and partly to hold a

\* Mr. Green sells some milk retail but, for comparative purposes, the figures given in the article are wholesale prices. Similarly, for fertilizers, Mr. Green had Marginal Assistance grants, but these have not been included in the figures quoted.

small chute parlour. No difficulty is envisaged in carrying this extra stock, since there was a considerable carry-over of silage this spring and much more silage than usual has been made this summer. Milk sales are likely to be about £2,250 annually for a concentrate bill of £400 and a fertilizer bill of £250.

After allowing for livestock valuation changes and paying for feed and fertilizer, the output for milk, lambs and wool was £983 in 1956-57. By 1958-59, this margin was £1,490 and by next year it should be £1,900. This farm, with a handy system of silage-making, self-feeding and parlour milking, can be run comfortably by Mr. Green, apart from the odd weekend and holidays. It provides a good living and is fully competitive with the majority of larger, better, lowland farms.

The policy which this farm is following is typical of many in the area. The majority of such farmers are well satisfied with the better returns they are now getting, compared with their previous system, and they look to the future with renewed confidence.

## Man as an Agricultural Machine

NIGEL HARVEY

MAN is the prime mover of all things agricultural. Yet, until comparatively recently, agricultural science took little interest in man as a machine and made little attempt to study his physical properties, powers and limitations within the context of the farm. It is, for example, easier to obtain sound advice on ways of making the best use of a tractor than on ways of making the best mechanical use of a man.

There is, it is true, a considerable research literature on what is appropriately called "human engineering in agriculture". But unfortunately many of the Continental and American publications on this subject are not readily available in this country. The report of the Farm Cardiac Seminar held at Purdue University in September 1958, which Professor W. H. M. Morris has kindly presented to the library of the Ministry of Agriculture, Fisheries and Food, is therefore a particularly welcome gift, for it describes the most ambitious project so far undertaken in this field.

In form, this project is an investigation into the best ways of helping Indiana farmers who suffer from heart-disease. In the corn belt, one of the most important of all American agricultural areas, this is a very real problem. Indiana farmers work under exacting climatic conditions and their average age is high—about 50; consequently, the incidence among them of death from heart trouble is heavy. But the main purposes of the project—the determination of the energy requirements for specific farm jobs and the development, in the light of these figures, of easier work methods and systems for farmers with heart trouble—are of more than local interest.

Man is a very expensive machine, and even the healthiest of us is interested in ways of decreasing effort and fatigue. A machine may be able to do a man's physical work but it cannot do his mental work, and nowadays the

successful farm depends on brain rather than brawn. It pays to economize in muscle power if it enables better use to be made of man's powers of observation and decision.

Professor Morris found, rather surprisingly, that most farm jobs could be classed as "moderate work". A fit man can maintain an expenditure of five Calories a minute for a working day, and the requirements of such operations as ploughing, cultivating, drilling and harvesting by tractor, driving livestock, opening bales, and even shovelling, are well under this figure. But in most routines there are peak periods when the expenditure of energy is considerable; lifting and carrying heavy weights, for example, or hitching and unhitching implements. Such peak periods may need three, four, five or even more times the physical effort of easier jobs. They may not last long, but they may be dangerous for the physically impaired farmer.

The advisory implications of these findings were discussed by Professor L. S. Hardin, the project leader, whose book *Farm Work Simplification* will be known to many English readers. Agricultural advisers, he said, had long used figures for the times required for different jobs. Now they were beginning to acquire figures on the human energy required as well. This would enable them to give a farmer with heart-disease information from which he could assess the energy requirements of his farming system in relation to his physical capacity, and compare the alternatives before him. He might, for example, quit farming altogether, hire a man or alter his system of management. He might, by mechanization or other means, eliminate the peak periods of energy requirements which were his greatest danger. The choice is his. But the adviser is now equipped with facts and figures to help him choose and plan wisely. More generally, the findings are also likely to prove of value to the rural doctor and the manufacturer of agricultural equipment.

The report is a substantial one, for its nineteen papers summarize and discuss the work of a team of agriculturists, economists, doctors, physiologists and sociologists from many parts of America over a period of years. But it is well worth the study of those concerned with farm efficiency, and in the future it may become one of the documentary classics of an established and expanding branch of agricultural science. It is available for reference in the Library of the Ministry of Agriculture, Whitehall Place (West), London, S.W.1. Printed copies will shortly be published by the Agricultural Experiment Station, Purdue University, Lafayette, Indiana.

Further work on the same general subject is now being planned by the Purdue team.



## Sixteen-week Turkey

JOHN HALLIWELL, N.D.P.

*National Agricultural Advisory Service, Yorks and Lancs Region*

Raising turkeys for marketing at sixteen weeks is a specialist operation. The object is to get the poults off to a good start, and to keep them growing fast throughout their lives. Moves and upsets should be kept to a minimum.

THE modern demand is for a medium-weight turkey at Christmas—usually of 10–15 lb. The producer knows that the small breeds which will give him these weights when marketed at 20–26 weeks are generally poorer food converters, and food can account for up to 75 per cent of total cost. These, briefly, are the reasons for the growing popularity of the sixteen-week turkey.

The system consists mainly of rearing large types of turkey on high protein, high energy diets, under reasonably sheltered housing conditions, and marketing them as early as possible. In the present state of scientific knowledge, sixteen weeks is about the age at which they will have achieved popular weights. The breeds used are either the Broad-breasted Bronze, or Whites.

The advantages of the system to the producer are fairly obvious. Besides meeting popular weight requirements, and therefore getting top selling prices per lb, he can usually obtain the same price per lb for stags as for hens. He gets a quicker turnover, and can easily put two batches a year through his houses. Lastly, he makes the maximum profit per ton of food.

The disadvantages of the sixteen-week turkey are nearly all connected with management. At the moment this system is for experts. The chief difficulty is that while it is possible to market a broad-breasted turkey with a finished appearance at sixteen weeks, it is all too easy to end up with a narrow-breasted, stubby carcass, which clearly stamps itself "unfinished".

### *Essential conditions of management*

What then are the essential conditions of management? First and foremost, the bird must be of the very broadest breasted type. Strain differences in this factor are considerable. And, whilst the day-old poult should not be too expensive, it is worth while remembering that an extra £5 per 100 poults adds less than 1d. a lb to production costs—a figure easily cancelled out by better food conversion in many strains.

Whites have the advantage that if they are stubby when sold, the stubs are not the dark disfigurements they are with the Bronze. Many people believe that the Broad-breasted Whites will be the main breed of the future. Caponizing both stags and hens three weeks or a month before killing is said to eliminate pin feathers almost completely, however.

A cheap and effective housing is the pole barn—a cheap, roofed structure with open sides. With its roof excluding rain and the open sides giving plenty of ventilation, this type of structure provides dry conditions. Straw is generally used as litter, the houses being strawed down at least once or twice a week. Recently one or two people have been advocating the broiler type of

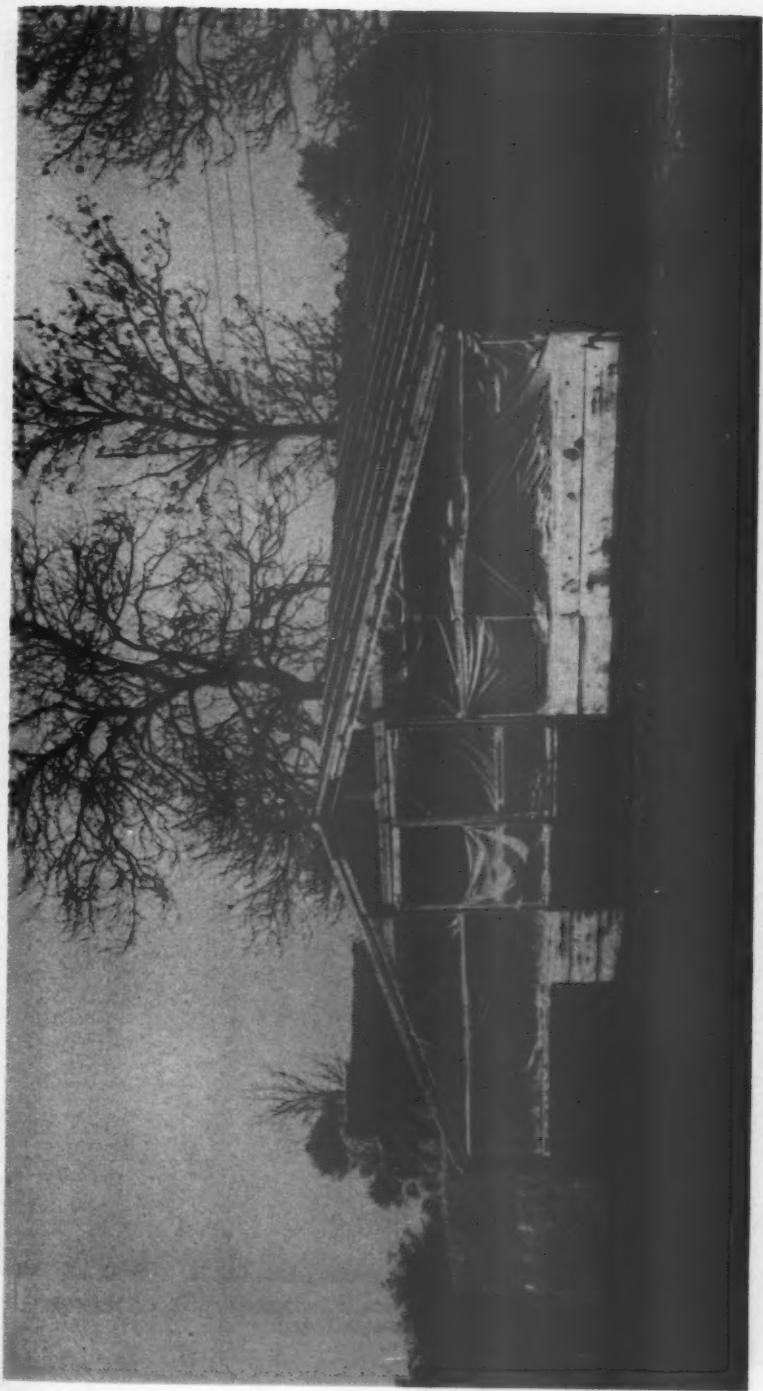


Photo: J. Halliwell

**Sixteen-week Turkey:** Pole barns covered with polythene sheeting, which can be rolled back as the birds grow, make very satisfactory rearing-houses.



Trusses of Berkeley (above) and Bluecrop. As with black currants, most of the crop is carried on second-year wood.



A young bush of Dixi, and (inset) a punnet of ripe berries from the early variety Burlington.

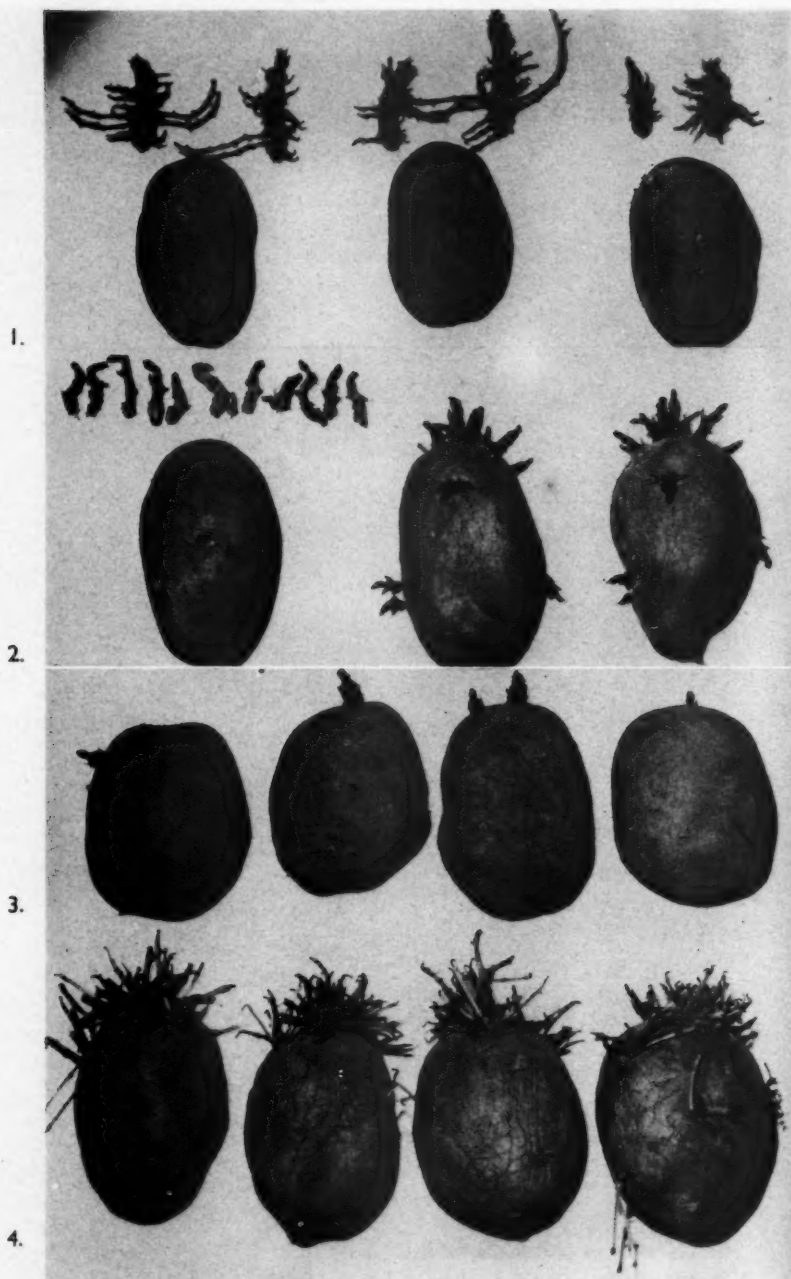


Photo: James Gillespie

**Stormont 480:** 1. Trayed up in warm glasshouse 8th October 1958. 2. Stored at 36°F and trays up in warm glasshouse 8th January 1959. **King Edward:** the effect of extremes of age on sprouting: 3. Seed two months old trays up in warm glasshouse 9th December 1958. 4. Seed fifteen months old stored at 36°F and sprouted 3rd January 1959.



## SIXTEEN-WEEK TURKEY

house for these short-life turkeys. The economics of this system, however, are doubtful. The high cost of insulation and fittings mean either that the turkeys will carry a heavy burden of depreciation, or that the farmer will try to cram too many birds into the house, with subsequent disease risks. It also seems to be a fact that after the 6-8-week stage, turkeys seem to thrive better in open conditions, rather than warm, stuffy houses. They appear to want all the fresh air possible.

It is essential that the birds have as few changes of environment as possible, and a "straight run" from day-old to killing in one house is desirable. With open-sided pole barns this becomes impossible. A system which has proved very successful in the East Riding is that of tacking transparent plastic sheeting around the outside of a pole barn while the poults are in the brooding stage. Later it can gradually be rolled back as the birds grow. Provided the plastic is battened on properly it seems to withstand the strongest gale, and it is so cheap that it can be thrown away after use if need be.

### *Feeding*

Feeding obviously plays a vital part in the success or failure of a sixteen-week turkey venture. These days the arguments as to what constitutes the best type of diet seem to get bogged down in considerations of various drugs, antibiotics and so on. But the basic factor which seems to influence the growth rate of a turkey is the protein level. Up to 30 per cent in a ration seems desirable nutritionally, although prices often mean that 20-25 per cent is a more economic level. With such a high protein content, the diet must necessarily be of the high energy type as well.

The simplest way to fulfil these requirements is to feed a good starter ration from day-old to killing. During the last four weeks, oats or barley can be introduced to form about a quarter of the diet. Alternatively, most firms now manufacture special finisher diets, to be fed without grain supplements.

The use of antibiotics may be justified when more than one batch has passed through a house. So called pre-starter or super-starter diets may also be justified in certain cases, especially with late-hatched poults, which tend to be just that bit more sluggish. The use of drugs to prevent blackhead or coccidiosis is open to question. The best advice seems to be "if in doubt—use them", but it is better to rely on management and hygiene and keep the drugs in reserve in case of an outbreak. A new development in feeding, which seems to have possibilities, is that of differentiating between the diets of stags and hens. This method of feeding two different rations depends, of course, on the turkeys being sexed at day-old, and the sexes being reared separately.

### *Caponizing*

What about caponizing? It is claimed that in addition to eliminating pin feathers, caponizing also induces the bird to deposit more fat under the skin, greatly enhancing the carcass appearance, and results in a better food conversion. Disadvantages sometimes met are that caponizing leads to more fighting and treading, and makes separation of the sexes essential. From experience, I would say that caponizing of Bronze turkeys at any rate, is prob-

ably worth while. But it must not be carried out earlier than a month before killing, and three weeks is probably better.

There is scope for tremendous advance in the technique, particularly in the breeding of earlier-finishing types of turkey. Most breeders have not started to tackle this problem yet. There is also need for a lot more definite knowledge on feeding and housing. Nevertheless, the fact that some producers have already found sixteen-week turkeys to be very profitable suggests that in future years most of the trade in whole carcasses will be in birds of this age or younger.

## Control of Sprout Numbers in Maincrop Potatoes

R. D. TOOSEY, B.SC., N.D.A.

*Essex Institute of Agriculture, Chelmsford*

Sprout numbers are not generally controlled in maincrop potatoes. But experiments at the Essex Institute of Agriculture suggest that maincrop seed can be managed to produce only one or two sprouts, regardless of its source of origin.

CERTAIN maincrop potato varieties, notably King Edward, often produce an excessive proportion of chats, and consequently a low yield of good sized ware. Experiments here in 1957 and 1958 have shown that when sprouted seed is used, the quantity of large ware potatoes in King Edward and Stormont 480 may be greatly increased by reducing the number of sprouts per set.<sup>1</sup> This practice gave highly satisfactory results in our experiments, but the sprouts not required were removed by hand, which is obviously impracticable on a field scale.

It has for some time been commercial practice<sup>2</sup> to make early potatoes, notably once-grown Arran Pilot, produce only one or two sprouts per set by traying up the seed in late summer or early autumn under warm conditions. Once the sprouts are properly formed, the chitting house is allowed to cool off, to prevent them from growing too large. Manual desprouting of the seed is not needed. But this is not generally done with maincrop potatoes, much of the seed for which arrives from Scotland and Northern Ireland late in the winter. In 1956-57 and 1957-58, once-grown seed of both early and maincrop varieties grown at this Institute produced very few sprouts when trayed up in a warm glasshouse in August or September, while seed of the same varieties from Scotland or Northern Ireland received and trayed up during January produced many sprouts. However, when the once-grown seed was trayed up in January, any sprouts having been removed, it produced as many sprouts as the imported seed. Growers often say that the latter produces more sprouts, but our observations indicated that this might be due to management and not to the origin of the seed. In fact, seed could be managed to produce only one or two sprouts regardless of its source of origin.

### *Factors governing sprouting*

After potato tubers mature, they go through a period of dormancy.<sup>3, 4, 5</sup> If the storage temperature at the end of this is high enough, the seed tubers tend to produce a single sprout, usually at the apical end, which suppresses the growth of further sprouts. This is known as the apically dominant or single sprouting phase, and normally occurs during the autumn. When the temperature is too low for sprouting to occur, the tuber passes out of this phase and the number of sprouts it will eventually produce tends to increase with advancing age. If sprouting is delayed until late in the winter, the seed may have reached the multiple sprouting phase, and often produces several sprouts per set.

Both the length of the dormancy period and the date at which the tubers pass through these sprouting phases differ with varieties<sup>4</sup> and seasons. The removal of the first sprouts will cause a greater number of sprouts to develop.<sup>5</sup> The average number is also governed by and increases in proportion to the weight of the individual seed.<sup>6</sup> Very small seed (chats and thirds) will produce fewer sprouts, but it may be less vigorous and less reliable than larger seed. Consequently, as the yield of the crop is known to be substantially influenced by the weight of seed planted,<sup>7</sup> the use of very small tubers is not always advisable.

### *Experimental treatments*

Accordingly, in September 1958 we started to investigate the effect of the date of sprouting, weight, and origin of the seed on the number of sprouts produced per set. Stormont 480 was chosen initially because of the excessive number of sprouts, and resultant high proportion of chats, that it produced. On 7-8th October 1958, 3 cwt each of Certified "A" Northern Ireland and once-grown seed of Stormont 480 were each divided by weight into three grades: small ( $1\frac{1}{4}$ - $1\frac{3}{4}$  oz), medium ( $1\frac{3}{4}$ - $2\frac{1}{4}$  oz), and large ( $2\frac{1}{4}$ -4 oz). Damaged tubers and those outside these weight limits were discarded. Each grade was divided into five sprouting treatments:

1. Trayed up in a warm glasshouse, which was artificially heated, on 8th October;
2. Trayed up in a light store, heated only in frosty weather, on 8th October;
3. Trayed up in the same store as (2) on 8th October, the trays darkened, all sprouts removed and placed in the warm glasshouse on 2nd February 1959;
- 4,5. Stored at 36°F to prevent all sprout growth and trayed up in the glasshouse on 8th January and 8th March 1959 respectively.

The average monthly maximum and minimum temperatures for the warm glasshouse and light store are shown in Table 1. The sprouts were counted on seventy tubers taken at random from each of the thirty treatment combinations, but diseased tubers were discarded. In addition, 2 cwt of Certified "A" Northern Ireland King Edward seed, which arrived on 8th December, was similarly divided into three weight grades, but only two sprouting treatments were used:

1. Trayed up in the warm glasshouse.
2. Trayed up in the light store; both on 9th December 1958.

The sprouts were counted on one hundred tubers from each treatment

# CONTROL OF SPROUT NUMBERS IN MAINCROP POTATOES

combination. No attempt was made to control the size of the sprouts in either variety, except by providing adequate light.

**Table 1**  
*Average monthly maximum-minimum temperatures*  
*August 1958-April 1959*

	Degrees F					
	Warm glasshouse		Light store		Outside	
	Max.	Min.	Max.	Min.	Max.	Min.
August	—	—	—	—	69	52
September	—	—	—	—	67	51
October	67	57	59	52	59	46
November	66	55	49	42	48	39
December	64	54	44	39	47	35
January	62	49	44	40	41	29
February	67	50	46	41	45	33
March	70	51	52	42	53	37
April	71	51	58	46	58	42

**Table 2**  
*Stormont 480*  
*Average number of sprouts per set, from all seed.*  
*The effect of sprouting treatment and weight of seed.*

Grade of seed	SPROUTING TREATMENT					
	Warm glass-house	Trayed up 8.10.58		Stored at 36°F		Mean
		Not desprouted	Desprouted 2.2.59	Trayed up in warm glasshouse 8.1.59	8.3.59	
oz						
1½-1½	1.7	5.3	6.9	8.1	8.5	6.1
1½-2½	1.9	6.3	8.2	10.2	10.2	7.4
2½-4	2.5	7.1	11.0	13.2	12.5	9.2
Mean	2.0	6.2	8.7	10.5	10.4	7.6

## Effects of treatments

The results obtained with Stormont 480 (Table 2) show that only when the seed was trayed up early and in artificial heat, were the desired one or two sprouts per set produced. The seed was still mainly in the single sprouting phase when the warmth induced it to sprout, and consequently most of the tubers produced only one or two sprouts, which suppressed the growth of any others throughout the life of the seed. When the seed was trayed up early *without* artificial heat, sprout growth was slow and most erratic, and very few sets produced only one or two sprouts. Many sets showed little growth until the middle of February, and by then were in the multiple sprouting phase. Early trayed up therefore showed little benefit when the temperature was too low to induce the seed to sprout in the single sprouting phase.

All the remaining treatments produced too many sprouts. In the seed which was desprouted on 2nd February and then resprouted in the warm glasshouse, the desprouting increased the number of sprouts per set, which

## in

Table 3

**King Edward (Certified "A" Northern Ireland)**

*Average number of sprouts per set.*

*The effect of sprouting treatment and weight of seed.*

Grade of seed	SPROUTING TREATMENT		Mean
	Trayed up Warm glasshouse	9.12.58 Light store	
oz			
11-14	1.3	2.5	1.9
14-24	1.7	3.4	2.6
24-4	1.7	4.3	3.0
Mean	1.6	3.4	2.5

Table 4

**Stormont 480**

*Average number of sprouts per set, from all seed.*

*The effect of source of seed and sprouting treatment.*

Source of seed	SPROUTING TREATMENT					Mean
	Trayed up 8.10.58			Stored at 36°F		
	Warm glass-house	Light store	Desprouted	Trayed up in warm glasshouse		
		Not desprouted	2.2.59	8.1.59	8.3.59	
Cert. "A"						
N. Ireland	2.1	6.1	8.7	11.2	10.4	7.7
Once-grown	1.9	6.3	8.7	9.8	10.4	7.4

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sprout is well established, especially with fast-sprouting varieties, the cooling of the store seems highly desirable. If a high temperature is maintained throughout the sprouting period, the production of excessively large sprouts is likely to exhaust the seed and seriously reduce the resulting crop.

Table 4 shows that in the case of Stormont 480 there was little difference between once-grown and Northern Ireland seed in the number of sprouts produced. The once-grown seed produced a slightly lower number of sprouts per set, but the difference is probably not significant. The once-grown seed did, however, sprout a little more quickly, and its growth was a little more vigorous. It seems, therefore, that given early delivery, imported seed can be managed to produce one or two sprouts as easily as once-grown seed.

The results obtained with both varieties show that the number of sprouts per set increased in proportion to the weight of the seed. The extent of this increase, however, was governed by the sprouting treatment, and was least where the seed was trayed up early under warm conditions. In both varieties the large seed so treated produced fewer sprouts than the small seed in any other treatment. The use of a sprouting technique appeared to reduce the number of sprouts per set more efficiently than the use of small seed, which in Stormont 480 was in itself quite useless. In this variety the number of sprouts could be controlled only by a sprouting technique. When large and small seed with the same number of sprouts were compared, the sprouts on the former were much larger, showing the greater vigour of the larger seed. This may not necessarily be an advantage in maincrop varieties. Considerable variation in the size of the sprouts on the same tuber was also noted.

Although the technique suggested is similar to that already used commercially for Arran Pilot, maincrop varieties are lifted rather later in the year, when the temperature is often too low to induce rapid sprouting (Table 1). In this case, the store should be artificially heated, especially for imported seed which may not arrive until November or even early December. Because it is cold outside at this time of the year, such late heating may prove costly and less effective. If only one or two sprouts per set are to be formed, both desprouting and the late delivery of the seed should be avoided.

Grateful acknowledgement is made to the Agricultural Research Council for the provision of funds, to Mr. J. E. Dunlop, of the Ministry of Agriculture, Northern Ireland, for collecting and shipping the seed, and to the Governors and Principal of this Institute for providing facilities.

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# Does Modern Farming Pay?

E. HARRIS, M.A.

*National Agricultural Advisory Service, South-west Region*

How one farm in north Wiltshire has made such good progress as a result of a farm management plan that its profits have doubled and are now two-and-a-half times the average for the district.

OUR best farmers are among the most progressive in the world, but there is rather a large gap between the average and the best. Many seem dubious of adopting new ideas if it means a radical change in their farming system, perhaps because more capital is usually required, in the form of buildings or for seeds, fertilizers and machinery. Some advisory officers have also had doubts, and some of us have been reluctant to advise changes which involved heavy capital expenditure. However, such gratifying financial returns are now coming in from farmers who took the plunge three or four years ago that we shall have less hesitation in recommending such changes in the future. These farmers were some of the first to take advantage of the farm management advice which now plays such an important part in agriculture.

One of these farms in north Wiltshire has made such good progress as a result of a farm management plan, doubling its profits, that I shall describe it in some detail. Some of the changes have been against the popular trend, but they have been borne out by results, and by the outcome of a survey of milk production costs in the south-west recently published by the Department of Agricultural Economics, University of Bristol. These results were obtained in a period when the prices of farm products, particularly milk, tended to fall.

The farm is in the medium-size range of 150-200 acres, on Oxford Clay. The soil is not heavy working when dry, but is badly drained, and the time for cultivations and grazing is limited. In 1955 a herd of 67 Friesian cows plus followers was kept, and the farm was all grass. Over 100 acres was in leys despite the difficulties of cultivation, and generous applications of fertilizer, with grassland management of a high standard, provided plenty of fodder for the herd. The stocking rate was above the average for the district at the time—1.61 acres per cow equivalent, compared with 1.99 acres. A large amount of silage was made, but the layout of the farm made buck-raking difficult and the farmer was one of the pioneers of forage harvesters in his district.

## *High production, heavy costs*

The farm was making a profit, but since the farmer was devoting all his energies to running and working the holding he did not consider it repaid him for the time and effort involved. The financial results in 1955 are shown in the table on p. 352.

# DOES MODERN FARMING PAY?

We see that while production was very high on this farm costs were heavy. The heaviest was in purchased feedingstuffs, despite the good grass production; the farmer had fallen into the common trap of overfeeding in search of high yields and buying his milk twice, once from the fertilizer bag and again from the cake bag.

Output			Costs		
	This farm	Average for similar farms		This farm	Average for similar farms
	£ per acre			£ per acre	
Milk	65.59	34.18	Bought foods	32.49	20.02
Cattle	9.06	4.86	Seeds and manures	5.77	3.37
Sheep	—	0.08	Rent	3.61	2.85
Pigs	—	5.04	Labour	10.74	8.24
Poultry and eggs	4.90	3.83	Contract	3.22	0.72
Crops	0.46	3.46	Power and		
Sundries	1.04	1.64	machinery	7.16	5.76
			Miscellaneous	7.15	3.87
Total	81.05	53.09			
			Total	70.14	44.83

	Net farm income	Stock	Herd average
	£ per acre	acres per livestock unit	gal
This farm	10.91	1.61	995
Average for similar farms	6.83	1.99	767

## Heavier stocking: winter wheat as cash crop

The obvious answer was to reduce the feeding costs, but this was not so easy as it might seem. The farmer liked to see his cattle looking well, and when previous attempts at reducing feed costs had led to great falls in milk yield his courage had failed him. Then how was the problem to be tackled? There were two ways: try to reduce the costs, or push the production up. A compromise was adopted. The farmer agreed to keep a tighter rein on his concentrate feeding—but only to prevent waste in the early stages—and not try to get a large amount of milk from grass and silage. To utilize the grass more fully the stocking rate was to be raised still further, by increasing the number of cows and introducing ten acres of wheat as a cash crop. All the cultivations and harvesting were to be done on contract and the wheat was to be sold straight from the combine. These changes have worked very well in the last two years, which have seen wet harvests, and the policy is to be continued until the cows get to the limit for the farm.

Some people may question the advisability of growing wheat on such a farm, but I am firmly convinced it can be very profitable provided that it is winter wheat and sown early, usually in September; if it is not sown then it will often not be sown at all, and spring wheat is not a good proposition on this land because it cannot be put in early enough. Yields have been good, just under two tons an acre, leaving a net profit from the wheat field of £27 an acre. The policy has meant buying some hay, but has saved buying straw, which in the last two winters has been as dear as hay purchased in July.

# DOES MODERN FARMING PAY?

The farm now carries 80 dairy cows and the stocking rate has gone up to 1.1 acres per cow equivalent. The financial results are:

	Output			Costs	
	This farm	Average for similar farms		This farm	Average for similar farms
	£ per acre			£ per acre	
Milk	66.0	36.9	Bought foods	26.9	15.1
Cattle	6.1	5.5	Seeds and manures	3.3	3.1
Sheep and wool	—	0.2	Rent	3.9	3.1
Pigs	—	2.2	Labour	9.6	10.5
Poultry and eggs	5.7	2.5	Contract	2.4	0.6
Cereals	3.1	2.2	Power and machinery	7.0	6.1
Sundries	0.8	2.9	Miscellaneous	4.2	4.1
Total	81.7	52.4	Total	57.3	42.6
Net farm income			Stock		
£ per acre			acres per livestock unit		
This farm	24.4			Herd average	
Average for similar farms	9.8			gal	
				927	
				827	

The profit has more than doubled, and is two-and-a-half times the average for the district. Total production has risen a little but the costs have fallen markedly. The greatest fall has been in feedingstuffs, but this was achieved in the summer. Almost all the winter milk comes from concentrates, with silage providing the bulk of the maintenance ration. However, in the second summer the farmer, disappointed with the first year's trading on the new plan as not showing enough improvement, cut out all concentrates to the cows from 1st May to 1st August. This had no effect on the next winter's milk but has contributed largely to the favourable profit. Parlour milking has been introduced to enable the same staff to cope with extra cows, and this has saved on overtime.

## Target of 100 cows

What of the future? Although the financial results are favourable at the moment, the farmer does not intend to stand still. He is preparing schemes to make his farm easier to run, and to help maintain income if prices should fall further. A covered silo is to be erected, and self-feeding started. If wheat becomes unprofitable it will be dropped; no losses on equipment will be incurred. Cow numbers are being steadily increased, with a target of 100. The feeding is to be thoroughly overhauled, and serious attempts made to obtain more milk from the farm without sacrificing more in the way of milk yield per cow.

All this production calls for generous dressings of fertilizers. These have been applied over a long period and every bit of farmyard manure has been returned to the farm. This has resulted in a very high state of fertility on land which once had a poor reputation, and undoubtedly contributes greatly to the success of the farm. Seeds can now be sown in the knowledge that whatever the weather a good crop will result.

# Rotational Forward Creep Grazing

G. W. WHITEHOUSE, N.D.A.

National Agricultural Advisory Service, Yorks and Lancs Region

Part of the Ministry's livestock exhibit at the National Sheep Exhibition, Harrogate, on 8-9th October, demonstrated rotational forward creep grazing of ewes and lambs. See also p. 362.

ALTHOUGH forward creeping of lambs is an old-established practice in arable flocks, it has only recently been used in grassland flocks. The importance of grass in fat lamb production is being appreciated more and more; and there is evidence that after the lamb is six weeks old, good quality young grass, actively growing and free from stomach worms, is just as important as the ewe's milk—if not more so. Rotational forward creep grazing is simply a system of moving the ewes and lambs round a series of plots, usually six, and allowing the lambs access to a plot ahead of the ewes. Essentially it is a means of using the pasture when it is most nutritious: intensive stocking is necessary to keep the grass at this stage, and prevent its becoming overgrown and stemmy. Ten ewes and fifteen lambs per acre have been kept successfully. Under ideal conditions this figure may be exceeded, but the normal rate of stocking is slightly lower.

Experience on farms in Yorkshire and Lancashire during the last twelve months has emphasized the following points. Clean land is essential. Ewes and lambs should be grazed only on fields which did not carry sheep the previous year, unless the land is known to be free from stomach worms. Once rotational forward creep grazing is adopted, it becomes easier to provide clean land each year; the system is a most important and valuable factor in controlling the burden of worms, especially *Nematodirus*.

The grass must never become overgrown. Ideally, the plots should be eaten off and the flock moved to a fresh bite every three or four days. It is usual to manure for an early bite. The spring of 1959 was marked by an early growth of grass, especially on new leys, and better results were obtained when little or no artificial fertilizer was applied until after the ewes had the grazing under control—that is to say, following the second grazing. The quality of the grass was maintained and the drought did less damage.

The lambs gain weight much more quickly when they creep forward to a young, fresh bite; one of the best results obtained this year was a net live-weight gain of 860 lb per acre. Once the habit of creeping has been formed the lambs use the creep freely; shepherding is easier and takes much less time. A clean water supply is essential. Creeps in which the lambs crawl under an adjustable horizontal bar are very effective and generally favoured.

The cost of installing the system varies with the size and shape of the field. Perimeter fencing is usually already in position, and only internal fencing, creeps, hurdles for gateways, and water supplies are required. Material to divide one particular seventeen-acre field into six plots, with water piping and troughs, cost £122: assuming a four-year life, and allowing for labour charges for erection, this gave an annual cost of £2 6s. 6d. per acre.



# Calculating Winter Keep

J. FEATHERSTONE

*National Agricultural Advisory Service, West Midland Region*

THIS summer has left a legacy of dried-out pastures, and already many farmers have had to dip into their hay stocks. Kale and silage may not be plentiful and roots will almost certainly yield below average. Thinking about feeding during coming months, the first step is to assess the quantity and quality of available foods. With baled hay, straw and with corn in sacks, this is simple enough, but bulked foods present more difficulty. The following figures of cwt per cu. yard may help: silage 12, hay 2-2½, straw 1, roots 8, oats 8, wheat and barley 12.

Consider then the total stock to be carried. The food needs of pigs and poultry are easy to calculate. Most of their diet (over 80 per cent) consists of cereal foods, so the main questions concern the quantity of protein and mineral supplements needed to balance the rations, and what proportion of the cereals can come from the farm.

Sheep may need little else but 2-3 lb hay per head per day under hard conditions. For lambing ewes and fattening tegs, a total of about ½ cwt concentrates, again mainly cereals, should be allocated.

Cattle, of course, are the main consumers of home-grown fodder and succulents, and it is with cattle, especially dairy cows, that the greatest savings of bought food can be made. The object should be to provide as much as possible of their daily diet from the cheaper home-grown foods, consistent, however, with their well-being and performance. As a rough guide, about 55-60 cwt of average hay (or its equivalent in other foods such as silage, kale, roots, straw or beet pulp) will be needed by each adult beast over a period of five winter months, for maintenance and either the production of one pound liveweight gain or one gallon of milk per day. Specimen rations are:

## *Winter feeding of cows (10 cwt) for maintenance and 1 gallon*

	Early winter		Late winter	
		lb		lb
Mainly grass farm	Hay	6	Hay	6
	Kale	56	Silage	70
	Silage	25		
Mixed arable farm	Hay	8	Hay	8
	Beet tops	35	Silage	60
	Kale	35		
Mainly arable farm	Straw	10	Straw	10
	Beet tops	40	Silage	45
	Kale	45	Mangolds	45

With good quality fodder, these rations should provide for more than the first gallon, particularly in respect of protein. Thus it may be possible to

## CALCULATING WINTER KEEP

keep up the level of milk by using a cereal food instead of bought or balanced concentrates for the second gallon.

The younger cattle, ranging from calves of six months up to strong stores, will consume on average about one-half of the above amounts, but the best quality fodder should be reserved for calves and in-calf cows. For dairy cows, it is far better to be generous early on in the lactation and a week or two before they calve, than to attempt to sustain a falling yield later on.

Advice on milling and mixing on the farm as well as on the actual rationing schedules is readily available from local N.A.A.S. officers. Remember always to weigh food occasionally and so check waste.

## THE MINISTRY'S PUBLICATIONS

Since the list published in the October 1959 number of *AGRICULTURE* (p. 308), the following publications have been issued.

### MAJOR PUBLICATIONS

*Copies are obtainable from Government Bookshops or through any bookseller at the prices quoted.*

Farmers' Book-keeping and Income Tax (*New*) 2s. 6d. (2s. 8d. by post). A simple and concise guide to the keeping of farming accounts. The information on income tax includes charges made under the Finance Act, 1959.

Agricultural Statistics 1957-58. United Kingdom Agricultural Censuses and Production (*New*) 3s. 6d. (3s. 10d. by post)

Royal Botanic Gardens, Kew. Illustrated Guide (*Revised*) 2s. 6d. (2s. 11d. by post)

Cereals Deficiency Payments Scheme, 1959 edition (*New*) 2s. 6d. (2s. 8d. by post)

### LEAFLETS

*Up to six single copies of Advisory Leaflets may be obtained free on application to the Ministry (Publications), Soho Square, London, W.1. Copies beyond this limit must be purchased from Government Bookshops, price 3d. each (5d. by post).*

#### ADVISORY LEAFLETS

No. 315. Choosing Selective Weedkillers for Cereals (*Revised*)

No. 358. Onions (*Revised*)

No. 436. Selective Weed Control in Cereals (*Revised*)

#### FIXED EQUIPMENT OF THE FARM LEAFLETS

No. 1. Cowhouses in Modern Practice (*Revised*) 9d. (11d. by post)

No. 40. Farm Buildings: Wall Construction (*New*) 1s. (1s. 2d. by post)

# The Fight Against Contagious Abortion

E. C. HULSE, B.SC., M.R.C.V.S.

Ministry of Agriculture, Central Veterinary Laboratory, Weybridge

A single injection of Strain 19 vaccine will protect a cow against contagious abortion (brucellosis) for at least five pregnancies.

CONTAGIOUS abortion is caused by a micro-organism known as *Brucella abortus*. This minute germ is capable of infecting our cattle by contamination of feedingstuffs, bedding and water, and may also attack an animal through the undamaged eye or skin. Contamination of fodder, pastures, bedding and water occurs after a cow infected with the disease has slipped her calf. The infection may also be spread by dogs and vermin having access to unburied contaminated material such as the afterbirth or the aborted calf. Bulls may also become carriers of the disease.

Usually the first indication of infection is the abortion which occurs at about the seventh month of pregnancy; some cows will abort more than once. On the other hand, an infected cow may carry her calf to full term, but the afterbirth and discharges will be highly infective, and the milk may also contain the germ. At first the infection produces a high rate of abortions—an "abortion storm"—in a herd, but as the older animals gradually acquire a natural resistance, the disease becomes confined to the young, first-calf heifers.

An outbreak of contagious abortion lowers the milk yield very considerably and breeding troubles frequently occur after infection; infertility and possibly permanent sterility may follow. How can such a serious problem be overcome?

Shortly before the second world war, American scientists evolved a vaccine known as Strain 19, which effectively protected calves against the infection. This was introduced into Great Britain in 1941, and since that time the Central Veterinary Laboratory has produced and sent out several million doses. The vaccine is a suspension of living germs in a saline solution, and great care has to be exercised to ensure that each batch conforms to a precise standard of bacteriological purity and protective efficiency. In its liquid form, it quickly deteriorates under high temperatures or unfavourable conditions of storage. A "freeze dried" vaccine has therefore been developed which is much more resistant to temperature changes and can be stored for many months without degeneration.

Heifer calves between the ages of six and nine months are vaccinated subcutaneously by veterinary surgeons. The single injection will protect the animal for at least five pregnancies.

The first line of defence against contagious abortion is to vaccinate *all* heifer calves as they reach the required age. Where the disease already exists in a herd, general hygienic precautions must, of course, be taken; it must be emphasized that the vaccine cannot cure the disease once an animal is infected.

## 19. The Vale of Glamorgan

J. H. HAMILTON, N.D.A., N.D.D.

*District Advisory Officer*

THE Vale of Glamorgan contains some of the finest land in Wales. Almost semi-circular in shape, about 18 miles long and 5 to 6 miles wide, it is bounded in the north by the A48 trunk road from Cardiff through Bridgend to Swansea, and in the south by the Bristol Channel. The river Ely at Cardiff and the Ogmore from Bridgend to the sea form the eastern and western boundaries respectively.

Although there are  $1\frac{1}{2}$  million people living in the county—about half the population of Wales—the Vale is almost entirely rural. Industry is confined to the port of Barry and to some extensive quarries, supplying limestone to one of the largest steel works in Europe at Margam a few miles to the west, as well as for the manufacture of cement.

The Vale has played its part in the history of Wales. The ancient borough and town of Llantwit Major is the reputed site of one of the earliest Christian settlements in the Principality and as such has exerted a considerable influence on Welsh culture. Many small picturesque villages are scattered throughout the Vale, with names such as Llancarfan, Llanmaes, Llyswoyney that recall their ancient heritage. There are also many monastic and castle ruins, which make this a very fruitful area for the interested historian.

The soil, a medium-heavy clay, is derived in the main from the lower Lias limestone with shale. It varies from about six inches to two feet deep. Three small areas on the western, eastern and northern boundaries have a thin, medium loam derived from Carboniferous Limestone, and small areas of very stiff alluvial silt clays are to be found in the narrow valleys of the rivers Thaw, Weycock and Kenson. There are few sandy beaches on this coast, the shore being mainly cliff edge of the lower Lias limestone, which varies in height from 100 to 200 feet.

Comparatively mild winters, an annual rainfall of about thirty-five inches and an elevation of about 150–300 feet, make this an ideal grassland area. The farms are relatively small, averaging around seventy-five acres. They carry about twenty cows with followers and crop a small area with corn and roots. There are very few farms over 250 acres, and because the holdings are so small the dairy herd is the financial backbone of most of them. The bigger farms are truly mixed; beef cattle, sheep and arable cropping blending with the dairy herd, the biggest of which, even on these farms, does not exceed sixty cows. This almost universal pattern of dairying is largely the result of the second world war: before that, the farming system involved the fattening of cattle, sheep, some arable, and limited dairying. The stock on the farms has also changed, the British Friesian now being the Vale cow. Before the war many herds were of mixed or cross-bred types. With the

introduction of A.I., cross breeding has virtually disappeared except for those cows which are mated with the ever-popular Hereford or Aberdeen-Angus for beef calves.

Sheep numbers are rapidly approaching the pre-war level, and the breeds and cross-breeds kept are numerous. Crosses of the Kerry Hill, Clun, Suffolk and Welsh Mountain breeds are the most common, and the Suffolk is by far the most popular ram for the production of fat lambs.

Most farms are desperately short of adequate wintering accommodation for cattle; consequently, much damage was and is still done to the pastures by winter treading. Yarding of both dairy and beef herds, a development which has been facilitated by the Farm Improvement Scheme, is becoming more popular. The improvement in pastures merely by keeping the cattle off them during the winter is remarkable and justifies, on that score alone, the cost of the new buildings. On the smaller dairy farms where yarding is practised, the shortage of straw is severe. The reduced corn acreage, coupled with the use of modern varieties of short-strawed cereals for combining, is making the cost of litter a significant item of expenditure.

Ley farming has not made great inroads into the Vale, and most farmers are still reluctant to break up old pastures. Only in certain instances is this policy justifiable. Since the one-year ley in the arable break went out of fashion some years ago, the ley system is slowly spreading. A number of pioneers in the area are showing what the plough can do to improve these old pastures.

Silage is not by any means the common method of conserving grass. The hay baler reigns supreme, but many farmers are working gradually towards an all-silage winter feeding programme. Very many more can be called occasional "grass salvagers". Almost all the silage is made under Dutch barns, where access from a lean-to for self-feeding can be provided if desired. Fortunately, better techniques of haymaking are being practised, producing much better hay by reducing substantially all the losses involved in the common "sandwich toasting" method.

The heaviest cereal crop is winter wheat, many farmers regularly harvesting 2 tons and more per acre. Spring wheat too, particularly the newer varieties, regularly crops over 30 cwt per acre, and consequently the acreage devoted to this crop is increasing. Winter oats and spring barley also yield well on very many farms. Spring oats, however, vary widely in yield from year to year, because of the difficulties of early spring cultivation on stiffish clay.

As in the rest of the country, the acreage of rowcrop roots is gradually falling. Small areas of heavy-yielding mangolds, swedes and kale are grown; the kale crop is generally hand cut and carted. Broadcast kale and rape for strip grazing by dairy cows are very popular on the freer-draining soils. Though they are not a very successful crop, an acre or two of potatoes is grown on the bigger farms for sale retail in nearby villages.

The farmers themselves are of the best; always ready to argue, yet prepared to listen to argument. They are a pleasure to work with and to call friends.



### At the Farmers' Club

## Recent Developments in Farm Buildings

The first of this winter's papers at the Farmers' Club, about recent developments in farm buildings, was given by MR. W. G. BENOY, F.R.I.B.A., on 14th October. Mr. Benoy began by acknowledging gracefully that developments which have justified themselves, particularly in this country, have nearly all come from farmers and specialist manufacturers—not from architects. He then proceeded to give a stimulating account, from the architect's point of view, of current ideas on the siting, planning, layout and construction of farm buildings, excluding poultry buildings on the grounds that these are amply taken care of by specialist firms.

On siting, Mr. Benoy stressed the benefits to be gained in flexibility and economy of man-power from concentrating all the buildings in one group. There is no point, he said, in building on a steep slope if it can be avoided. "As an architect, one of the few sweeping statements I have to make on this subject of farm buildings is that given half a dozen Dutch barns of sizes to suit the problem, the building needs of any farm can be satisfied in an economical and efficient manner." Pigs, poultry, calves and potato stores need buildings with heat insulation; corn stores, cattle yards, cowsheds and milking parlours do not.

For corn storage, with the push-button, continuous-flow grain plant we may have gone slightly beyond the limits of economic common sense. People have had a lot of success with grain storage on flat floors, using portable conveying equipment. This allows savings by eliminating bin walls and costly fixed conveyors and elevators. Large-capacity sunken intake pits, which are expensive to waterproof, and always need to be, could be replaced by smaller pits taking one trailer load—say 2½ tons—or even by a small sump taking only a sack or so, emptied by a high-speed elevator into the pre-dry bin. A generous concrete paved area around the sump would allow for emergency tipping in the event of power failure. Self-emptying hopper bins are only justifiable for pre-dry storage bins which are used frequently.

There appears to be a positive move towards the fully enclosed shed, with sliding doors, to house large, expensive field equipment. In potato stores, frost protection is vital—nine inches of brickwork alone is inadequate. The siting of the dairy in relation to the cowshed is important: in a double rank cowshed, the dairy is best situated half way up one side, even though this may mean losing a standing to get at it. Slatted wooden floors for cattle yards seem best for regions where straw is scarce and dear. Elsewhere they may not be economically worth while. Mr. McNeil's idea of bedding down the cows on top of the silage clamp is an admirable piece of clear thinking, apparently without any major snags.

We have realized at last that pigs must be kept warm, and much ingenuity has been applied to providing them with ideal living conditions and simultaneously achieving time-saving routines for feeding and handling manure.

Mechanical equipment for cleaning out the dunging yard each day works well, but Mr. Benoy challenged the wisdom of end-to-end cleaning in a series of pig yards on the grounds of the risk of disease transmission.

He also questioned the soundness of designing fattening houses specifically to allow the pigman to stand upright while weighing out the feed. To allow him headroom means providing 50 cubic feet per pig, but less insulation would be needed if the cubic contents of the piggery could be halved, in line with the pig's natural habitat. Mr. Solari's economic and ingenious design reduces the cubic capacity to 20 cubic feet per pig by providing sleeping quarters only 3 feet high, while retaining a 7-feet high central feeding passage. Since the dung yards lie beyond the sleeping and feeding pens, a side-operated muck loader can be used for cleaning. And in an open-sided building the pigman has the advantage of not working continuously in a pig-laden atmosphere. "I should hate to spend my days with the pigs in one of those highly insulated places," said Mr. Benoy. "I can't think why Mr. Solari's design has not been more widely adopted."

The tandem layout for milking parlours has proved efficient, and the her-ringbone parlour, a more recent innovation, may also turn out to be useful. The introduction of reliable individual feeding hoppers with remote control would make this arrangement still more convenient. "When shall we make the next logical innovation," asked Mr. Benoy: "the elimination of the separate dairy, using the milking parlour, with its already hospital standards of cleanliness, for all purposes?"

The standard framed building in steel, concrete and timber is now widely accepted, and very recently has come to be used for 90 per cent of our agricultural needs. Portal frames made of steel give better headroom than traditional trusses, and cut out numerous joints and small steel members. Concrete spans get wider, and the timber industry is contributing laminated structures and hyperbolic shells that need few uprights. We should see a lot more timber farm buildings if the industry had a nation-wide all-in "supply and erect" service similar to that provided by the steel and concrete industries. Plastics for roof lights, waterproof walls, thermal and electrical insulation, and for guttering and pipework are now available, and need virtually no maintenance. So are plastic nuts and washers for fixing roof and wall sheeting.

"If I had to sum up recent developments in the truest sense in one word—it would be 'simplification', and that applies both to design and construction," concluded Mr. Benoy. "I believe it was an early associate of Henry Ford who said, 'What you don't fit, won't give no trouble.' He had something there."

Sylvia Laverton

## In Brief

### AGRICULTURE AND THE QUEEN'S SPEECH

The Queen's speech at the opening of Parliament on 27th October included an undertaking by the Government that the system of guaranteed prices and the long-term assurances in the Agriculture Act of 1957 would be continued. Proposals for horticulture were also foreshadowed: legislation will be introduced to provide grants for horticultural growers and the Government will encourage more economic marketing of produce. In particular, proposals will be put before Parliament for reorganizing and improving Covent Garden Market.

### THE COUNTRY COMES TO TOWN

At the wish of Sir Edmund Stockdale, the Lord Mayor-elect, agriculture will be the theme of the Lord Mayor's Show on 14th November.

Farming is one of Sir Edmund's main interests. His 800-acre farm at Upton Grey, near Basingstoke, is chiefly arable, but also carries a breeding flock of 250 Border Leicester x Cheviot sheep, and 30 pedigree Guernsey cattle which have won a number of prizes under Lady Stockdale's enthusiastic management. She and Sir Edmund have also started recently to raise Aberdeen-Angus cattle.

The Show, which will be led by the goddess Flora (by permission of Interflora), is being organized by the N.F.U., and will consist of nineteen floats escorted by hunt servants in uniform, gamekeepers and fishermen. Helicopters flying overhead will demonstrate crop-spraying techniques (into the Thames!). The floats will present two main themes: to stress the abundance and excellence of British farm produce; and to display the machinery that plays so large a part in its production.

Abundance is the theme of the N.F.U.'s own float, which will show fresh food from British farms pouring from a basket on to a table, around which sit sixteen men and women from many different walks of life. The Pig Industry Development Authority, the Egg Marketing Board (with lion prominent), the Fatstock Marketing Corporation, the N.F.U. Market Produce Show Society, and the National Milk Publicity Council all use this approach. The F.M.C.'s float tells Londoners that to feed London tomorrow will require 8,500 sheep, 9,700 pigs, 2,800 cattle and 31,000 poultry.

The emphasis on machinery is most prominent in the displays of the Agricultural Engineers' Association and the National Association of Agricultural Contractors, as one would expect. The latter are responsible for the helicopters. The theme of the National Union of Agricultural Workers is that machines need skilled operators.

The National Association of Corn and Agricultural Merchants and the manufacturers of agricultural chemicals, fertilizers, and compound feedingstuffs each have a separate float. Sir Edmund's personal connection with agriculture is conveyed by a Land-Rover carrying his farm manager, three gamekeepers and a dog, and by the Basingstoke and District Agricultural Society's float. He is the Society's President-elect.

### NATIONAL SHEEP EXHIBITION

The very successful National Sheep Exhibition, held at Harrogate on 8-9th October, has been acclaimed as the modern counterpart of the Sheep-shearings which Thomas Coke initiated at Holkham 150 years ago. Described by Mr. George

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Hedley, the honorary director, as "a triumph of voluntary effort", the exhibition was directed mainly to the commercial producer. Besides a display of pure-bred sheep from thirty societies, commercial lamb classes, in entries of three, were shown by ordinary producers for conformation, condition and evenness of matching. One in each batch was selected for slaughter by rolling dice, and speedily killed and returned to the showground by the F.M.C. to compare carcass with live entry. In the wool section there were competitive classes for fleeces and £10 championships awarded by the Royal Welsh Agricultural Society for the best short-woolled, long-woolled and hill or mountain fleeces.

The Exhibition was organized by the National Sheep Breeders' Association, in association with the Yorkshire Agricultural Society and the *Farmers Weekly*.

## RED SKY AT NIGHT

What is it like to be a hill sheep farmer? How is a good hill farm run? What precautions must be taken against the diseases and hazards to which hardy sheep are exposed on a typical Scottish hill sheep farm? These are some of the questions considered in I.C.I.'s new colour film, *Red Sky at Night*.

This film is at present being shown to farmers in Scotland, but the subject-matter is applicable to hill sheep farming areas in England and Wales, where it will be shown later. It was made mainly on Mr. A. A. Whyte's hill farm at Spott, Glenprosen, Kirriemuir, Angus, against a scenic background which delights the eye; and it shows that the present-day shepherd, like his predecessors, possesses traditional skills and a careful concern for his flock.

The importance of the selection of good breeding stock is stressed, and a year's work, which includes such seasonal activities as disease control, dipping, clipping, tupping and the anxieties of lambing time, is dealt with. How the benefits of the modern science of sheep management can be introduced is well illustrated by showing the precautions to be taken against pulpy kidney disease, parasitism, liver fluke and mineral deficiencies. Reference is also made to John's disease and controlled moor burning. Over all there is the friendly relationship between veterinary officer and shepherd.

Hill sheep farmers can learn much from this authentic and entertaining film, which is available on 16 mm Kodachrome from the Film Library, Imperial Chemical Industries Ltd., Imperial Chemical House, Millbank, London, S.W.1. Running time: 47 minutes.

## NEW DRUG TO CONTROL WARBLE FLY

The control of warble fly may take a new turn if the new drug, Etrolene, fulfils its promise. This drug kills the grub before it can penetrate the hide, and is administered to the animal in the early stages of the grub's passage through the body. It may be given as a drench or a drink, or as a bolus or pill. One dose a year is sufficient and a dosage varies with the liveweight of the animal—one bolus per 300 lb of live weight. Etrolene should not be given to animals less than 60 days before slaughter, nor should lactating cows be treated.

Etrolene was introduced into Canada and America two years ago by the Dow Chemical Co. of America, and has been used on over four million cattle. Occasional (usually mild) toxicity has been observed, particularly when dosing is carried out late in the season, that is to say during December and later. It is best, therefore, to dose early (between 1st September and the end of November) and to consult your veterinary surgeon should any difficulty arise. It must be remembered that 100 per cent kill of the warbles is not invariably obtained, and should a few warbles appear in the spring, the animals must, by law, be dressed with derris in the usual way.

Selected animals in the herds of the Agricultural Research Council's Field

Station, the Rowett Research Institute, the Grassland Research Institute, Wye College, and in many private herds have been treated experimentally during the past year. The Department of Agriculture in Eire also carried out trials at seven different centres during 1958-59.

The product is being marketed in this country by Dow Agrochemicals Ltd.

#### THE PREMIUM BOARS SCHEMES

On 1st October 1959, the Pig Industry Development Authority took over full administrative responsibility for the premium boars schemes which have been operated by the Agricultural Departments for over forty years.

Under the schemes, premiums are made available to cover part of the cost of buying a boar of good type for the use of a group of small farmers, so that small pig-farmers may be encouraged to use a better type of boar than they might otherwise do. The grants are paid to individuals or to organizations who are willing to make the services of a boar available for their neighbours' sows or gilts. Groups of pig-keepers who jointly own a boar for use in their respective herds are also eligible to apply for grant. To ensure that improvement of stock will result from the schemes, only pedigree boars which are entered or eligible for entry in the appropriate herd book are considered for grant, and in the past the Ministry has required that boars must be well above the average standard for the breed.

The majority of boars which have qualified for the premium grant in recent years have been of the Large White and Landrace breeds; grants have been payable whether boars of these or the Welsh breed have been mated to produce pure-bred or crossbred offspring. Grants have also been made for boars of other breeds, but recently only for use on sows or gilts of the same breed to produce pure-bred stock.

The premium is in the form of a grant paid to the owner of the boar at the commencement of the first year of service, the amount being related to the purchase price of the boar. If the owner continues to make the boar available for a second year, a second but small grant may be paid for that year.

#### INDOOR STORAGE OF POTATOES

The indoor storage of potatoes is becoming increasingly popular all over the country. Although of particular interest to those storing part or all of their crop until some time after Christmas, it is likely to become of even greater interest to those who carry over a part of the crop until late spring. The use of the Nonanol sprout suppression technique (see the March 1959 issue of this JOURNAL) promises to be particularly profitable for long-term storage.

Independence of weather conditions during grading is the most obvious advantage of indoor storage, but better working conditions, less frequent moving of the riddle, and the saving of time normally spent opening up clamps all lead to an improved standard of grading and to a very considerable increase in output—often 50-100 per cent. The crop can be graded and bagged in advance of requirements, as ample frost-proof storage space is normally available. Over-time working is possible even in mid-winter, as artificial light can be used. All types of vehicles can approach a well-sited store in bad weather and can often be loaded under cover. Of considerable importance nowadays is the fact that combined straw, usually too short and broken for clamping, is perfectly satisfactory for covering potatoes in a store. Barley and oat straw, which are not normally recommended for clamping, are also suitable. The straw thus used deteriorates so little that it can be used afterwards for litter.

Some farmers use straw rolls or very loose bales. Those can be satisfactory, but dense bales hinder the free passage of air and should not be used. There have been several cases of trouble arising from the use of bales.



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There is also less loss from disease in stores, since the drier conditions tend to prevent the development of bacterial soft rot and the consequent wet pockets so often found in clamps; even blighted tubers usually dry and shrivel.

Indoor storage does, of course, take extra capital, and new techniques of management have to be learned. New brick-built stores vary in cost from £6 10s. to £9 per ton of potatoes stored, depending on size and circumstances. Light, prefabricated buildings of the Romney hut type cost £3 10s. to £4 4s. per ton. But adaptation of existing buildings should always be borne in mind, the cost of which in many farmers' experience is seldom more than 20s. to 30s. per ton.

It is almost always necessary to buy an elevator, specially designed for loading potatoes into the store and at the same time capable of removing most of the loose soil. A new machine may cost anything from about £270 to nearly £500.

Longer hauls at harvest time may cause serious difficulties on some farms, but there are few such instances, and improved organization (say, by providing an extra trailer, or perhaps decentralizing the storage accommodation) can usually overcome them without greatly putting up the capital cost.

### SUGAR BEET PULP NUTS

Dried sugar beet pulp in the form of nuts is well spoken of by three farmers in the September issue of *The British Sugar Beet Review*. On one farm in Cambridgeshire these nuts have been fed to a herd of pedigree Guernseys and a flock of grass sheep. The bulk of the pulp nuts were fed to the ewes in a steaming-up ration mixed with oats and dairy nuts. The quantity per head was increased from  $\frac{1}{4}$  lb daily to a maximum of  $\frac{1}{2}$  lb as lambing time approached.

The sheep took very quickly to the nutted form of pulp, indicating that the mechanical process of producing the nuts had in no way reduced its palatability. If any of the ration accidentally fell on the ground, the pulp nuts were found and eaten, and not wasted, as would probably have been the case with loose pulp.

Before the introduction of pulp nuts into the dairy ration, loose dried pulp had been used in a mixture of home-grown beans and oats and dairy nuts, the pulp being soaked before mixing. Under this system, only small quantities could be mixed at one time, owing to the possibility of moulds being started by the damp pulp.

By replacing the loose pulp with pulp nuts, the whole ration was kept dry. Thus larger amounts could be mixed, mixing was easier and quicker, and wastage was reduced to a minimum. This concentrated mixture is fed to the cows during their time in the milking parlour. Due to the smaller bulk of the ration, the total feeding time was reduced and, as the mixture was dry, troughs required far less cleaning. B.S.C. Bulletin No. 13, *Sugar Beet Pulp Nuts—a new product*, is now available from the British Sugar Corporation Ltd., Latymer House, 134 Piccadilly, London, W.1.

### VIRUS YELLOWS DECREASED BY SPRAYING

In spite of the drought this year, most sugar beet crops promise to yield well. Although virus yellows has been prevalent in some areas, severe attacks were not so common as might be expected after a summer when both green and black aphids were prolific. Spraying crops with systemic insecticide in June undoubtedly helped to keep the disease under control; this was evident from the contrast between relatively green, sprayed crops and yellow, unsprayed ones in nearby fields. About three-quarters of the country's sugar beet (in some areas over 90 per cent of the acreage) has been sprayed this year.

Yellows occurs regularly in eastern England, and spraying pays so well that it is now an annual routine on many farms. Some growers had the annoying experience of being unable to buy systemic insecticide when they needed it this

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summer, and to avoid a recurrence of this it would be a good plan to buy a stock now to spray the sugar beet at least once next year.

Spraying in May or early June kills the green aphids on the few plants which have been infected with yellows at this time; this is important because their progeny would otherwise quickly spread the disease and cause the whole crop to turn yellow in August. Many of the aphids infesting sugar beet later in the season come from potatoes, cabbage and other plants that are immune from yellows. They do little harm to sugar beet, unless they pick up the virus in the sugar beet crop. When crops are continuously invaded by infective aphids, spraying will fail to control yellows, so growers must ensure that their farms have no sources of virus and aphids in the spring.

Mangold and fodder beet clamps are the most important source of green aphids and of yellows virus on farms in spring, because there are so many of them and they are evenly distributed throughout farming areas. To avoid the risk of having an aphid-infested clamp on his farm, a farmer should give careful consideration now to harvesting and storing his mangold crop.

When harvesting it is best to top the roots closely, removing all leaves and shoots. Only that proportion of the crop expected to remain for use after the beginning of April need be treated in this way, and it should be made into a separate clamp for late use. The remainder of the crop for early use can be harvested and clamped normally. Mangolds keep satisfactorily provided they are not topped too closely; cut them just above the lowest leaf scar.

Growing mangold crops have been sprayed experimentally with insecticide in the autumn, to kill the aphids on them shortly before harvesting and so decrease the number of aphids introduced into clamps. Most clamps made from sprayed mangolds have remained free from aphids in the spring, but an occasional one has been infested with *Myzus persicae* and some are infested with root aphids, but these are less important as carriers of yellows virus to sugar beet.

## SERVICES FOR FARMERS

Some weeks ago the Midland Bank announced that it was extending its services to farmers. Now it has published a small booklet giving details, in a precise, easy-to-read form, of the financial aid the Bank offers to arable, dairy and stock farmers, to help them towards the most efficient working of their farms.

The booklet, *Services for Farmers*, is available at all branches of the Midland Bank in England and Wales.

## MANGANESE DEFICIENCY

The recognition and treatment of manganese deficiency in plants and animals are very much matters for the expert. But the symptoms which should lead one to seek expert help are briefly and clearly described and illustrated in a leaflet, *Manganese for Plants and Animals*, which is obtainable free from Chemical and Carbon Products Ltd., 14 New Burlington Street, London, W.1.

## WORLD PLOUGHING CHAMPIONSHIP

Our cover photograph shows Laurence McMillan, of Belfast, winning the seventh World Ploughing Championship, which was held at Armoy, Co. Antrim, on 8-9th October. Mr. McMillan farms 120 acres in Co. Down. Competition was keen, the winner scoring 1,106 points, Charles Bonney coming second with 1,096, and his Canadian team-mate, Carl B. Willis, third with 1,087.

## OVEN BUSTER

A potato 14 inches long and 5½ inches across, weighing 3½ lb, has been grown on a farm in Lincolnshire.

## Book Reviews

**The Business of Farming.** EDWIN O. HECTOR. Phoenix. 21s.

An interesting and readable book which abounds in practical, shrewd counsel and contains much good advice for the inexperienced in farming. Yet one cannot escape the feeling that too large a canvas has been used with the material available. I was not surprised to learn that the author, in addition to being a highly successful practical farmer, having progressed from working a smallholding to being the owner-occupier of a 600-acre border farm in Berwickshire, is also an agricultural journalist; for whilst this is good journalism, the book reveals the demerits as well as the merits of such writing. In particular, it is in parts inadequate in its treatment (twenty-one different subjects are covered in 216 pages). As a personal account, it is to be highly commended as presenting a farmer's experiences and reflections on a marginal farm. It is largely autobiographical, partly philosophical, and would therefore have gained by a title and treatment more clearly defined.

Mr. Hector rightly says "there has been a revolution in farming since 1939" and makes frequent reference to the value of the Advisory Service, yet apparently has little use for a scientific training, particularly up to degree standard, nor for the Agricultural Economics Advisory Service. Farming is both art and science, and it is essentially a highly complex and increasingly competitive business; a farmer who is to move with the times must have a scientific approach to it.

Notwithstanding that the book, at least in parts, tends to fall between two stools, it reveals a fine, sensitive mind of real integrity with a considerable range of interest in farming and knowledge of farming questions and, most of all, a full appreciation of the human factor in agriculture. The first and last sentences may be quoted in evidence, "Character is more important than cash . . ." and "the land is honest—keep faith". Throughout its pages there is much down-to-earth practical observation, ranging from such subjects as estate management, choosing a

farm, and farm planning, to the part played by the farmer's wife. ("There is no doubt that the best load a farmer brings into his farmstead should be his wife.") A useful glossary of farming terms and an index are provided.

H.C.P.

**The Control of Pests and Diseases in Agricultural and Horticultural Crops.** G. L. HEY and K. MARSHALL. Vinton. 12s. 6d.

This little book is mainly a guide to the control, by the use of modern chemical pesticides, of a selection of pests and diseases affecting farm, market-garden and orchard crops. The subject is introduced by some eye-opening estimates of the crop losses attributed to pests and diseases, and by short, interesting sections on cultural and biological methods of control.

The main section contains very brief descriptions of each pest or disease, followed by the recommended chemical, timing of application and rate of use. In support of the advice on control are short chapters on the chemicals themselves, and on equipment required for varying conditions. There is an adequate index and a selection of reference books; while the common names of pests and diseases mentioned in the text are given in a glossary, together with their scientific names. The illustrations used as examples of pests and diseases are not good, and are inferior to the illustrations of equipment.

While the authors have succeeded in providing a fair, up-to-date and easy guide to chemical control, it is a pity that they did not widen the scope of their book to include other aspects of crop protection. Students in particular would benefit from a general account that included legislative measures, and the methods of raising virus-free planting material for crop production. It is to be hoped that the publishers will now provide, in the same series, a complementary work on the biology and diagnosis of selected crop pests and diseases.

P.A.

**West of Offa's Dyke: North Wales.** MAXWELL FRASER. Robert Hale. 18s.

Miss Maxwell Fraser happily continues to write on Wales. This is the second volume with a similar main title; the first dealt with the shires of south Wales. Six north Wales counties are described separately in this new book in a most interesting manner. Two chapters are devoted to each county, the first dealing with the shire and the second with the towns and urban areas. A great deal of information has been collected within the book's 188 pages, and the coding of the details must have been a great work of love.

No serious attempt has been made to capture the picturesque scenery of any part of North Wales, yet there is sufficient description to urge a visit to many of the places mentioned, some remote, some romantic, but all with some worthy historical connection, for Miss Fraser delights in ancient lore.

Although the six counties in the sequence Flint, Montgomery, Denbigh, Merioneth, Caernarvon and Anglesey are (apart from the first) mainly agricultural, yet the author does not attempt to describe the farming: neither technology, husbandry nor agricultural statistics are considered, but the background of historical development from anthropology to modern human activities are adequately covered. The author persists, quite rightly, in maintaining that the happenings of the past, remote as well as recent, continue to influence modern trends.

Briefly mentioned are the influence of men like the Rev. John Elias, the Methodist divine in Anglesey, Thomas Gee, the owner/editor of the Welsh weekly *Y Faner* in Denbighshire, and O. M. Edwards, the peasant boy of Merioneth who became an M.P., an Oxford Don and the Chief Inspector of Schools in Wales. All were of supreme importance in shaping the destiny of the Welsh people in their attitude towards both their native culture and industry.

These are only three of a great host of worthy people who played their part on the Welsh stage throughout the centuries. Slightly less important than the characters of these men were their works in the development of roads, railways, bridges, industries, etc. Incidentally, an inaccurate date (which may be a printing error) is given for the death of Tom Ellis, M.P., who died in 1899, not 1889.

Miss Fraser's book is worthy of attention by every countryman, no matter

where he lives. If he wishes to understand the agriculture of today he must surely read of the great upheavals in the countryside of yesterday. Here is provided a great deal of that essential background to the proper understanding of modern Welsh agriculture and to the influences affecting the Welsh way of life in rural areas as it is experienced even in these sophisticated days.

R.P.

**Conservation of Natural Resources** (2nd Edition). Edited by GUY-HAROLD SMITH. Chapman and Hall (London), John Wiley (New York). 68s.

The question this book examines is—are we living on capital or income; recklessly squandering our inheritance like the prodigal son, or not?

Only the American scene is examined. Nineteen specialists contribute, and the term "natural resources" is made to cover a wide field—from soil to water, forests, minerals, fuel, wildlife, fish and even man himself.

In Britain we still tend to regard the U.S.A. as the land of limitless opportunity, where the young man "goes west" and makes his fortune. We have seen too many Hollywood epics, and this book reminds us it is not in the least like that now; for instance, alienation of public lands stopped nearly forty years ago. The young man going west today meets his counterpart coming east. Thoughtful Americans are much concerned to preserve their natural resources, which are, in effect, the capital goods from which they and future generations must draw their livelihood, and this book is a mine of information on the subject.

After some introductory chapters, in which one is glad to see that the economics of the subject are dealt with, the great American soil erosion problem is examined. In fifty-three pages L. A. Wolfanger and W. A. Rockie ably describe the great soil groups and the risks from wind and water erosion. It must be remembered that potential soil destruction is a far greater problem in the U.S.A. than here, for that country is not blessed with the same favourable equitable climate as Britain. Soil loss has proceeded too fast in the U.S.A.—the creation of dust-bowls by ploughing unsuitable land or by overgrazing is well known—and the account

of conservation methods is very good, and not without application in Britain.

The possibilities of irrigation are dealt with, together with flood control and the use of water for power production. Fisheries and forests are considered and there is an important chapter on mineral fuels which, it must be remembered, are not renewable. Finally wildlife, man and his recreations receive attention.

Though scarcely bigger than the first edition, the second includes considerably more, as slightly smaller type and narrower margins have been used. To some extent it is written in a text-book style, but this had to be, as so much material has been put into the available space. The book is an extremely valuable contribution to the understanding of a grave but all too neglected problem.

G.O.

**Dwarf Pyramid Fruit Culture. D. MACER WRIGHT. Faber and Faber. 21s.**

As a comprehensive introduction to the intensive method of apple growing by using dwarf pyramids, this book is essentially for the grower who proposes to plant three to five acres, though it will probably find a wide audience among keen amateurs, too. It is a well-written book, clear and up to date, and it bears the stamp of an author who is not only skilled in, but fond of, growing a crop of apples with all its attendant difficulties. The eighteen chapters deal with most of the important aspects of this type of fruit culture: planting, pruning, spraying, picking and grading, storage and costings. On reading the book from cover to cover the sequence of chapters sometimes annoys one; for example, "Pruning" comes before "Planting" and the two important chapters "Varieties and Pollination" and "On Buying Stock" come after those on pest and disease control, picking and grading the crop.

The text is well illustrated by plates and line drawings; those showing symptoms of pest and disease damage are particularly helpful. However, the reviewer would have preferred to have seen two or three good examples of dwarf pyramid trees and orchards of different ages rather than the many plates of the egg, nymph and adult stages of certain pests.

One or two points need attention when a second edition is produced. General experience with Worcester Pearmain on

M.I rootstock has been that it is *weaker* than when grown on M.II. The overriding question, however, concerning the use of M.I should be the suitability of the soil rather than its influence on mildew, for this rootstock is notoriously intolerant of dry sand and gravel soils, conditions which are very hard to bring under control. It is difficult, and in fact unnecessary, to burn mildew infections when removed and no harm seems to result from dropping them on the ground.

The book is indexed, and it ends with four appendices on spray programmes, a germination table for apple scab spores (the Mills Scale), organic manures, and a note on the new Malling rootstock, M.26, shortly to be introduced, which may prove valuable for dwarf pyramid culture.

A.P.P.

**A Modern Guide to Pig Husbandry. W. E. COEY. Vinton. 12s. 6d.**

*A Modern Guide to Pig Husbandry* is a real fountain of knowledge for both the established pig-keeper and the beginner. It is very sound to start, as the author does, by discussing the end product—the carcass—so long as its importance is kept in true perspective with the rest of the factors determining profit. Mr. Coey has kept well within his terms of reference.

Making use of past fundamentals, such as the effect of high and low planes of nutrition, he ties up technical information with practice to make it obvious that high weaning weights and low conversion figures will ensure maximum profit. Chapter 11 reviews the cost and return aspect of the business very clearly without being too dogmatic, and points out in no uncertain terms how easy it is to range from a loss of £77 to a profit of £1,700. To give the highest profit it is obvious that a pig must be completely healthy, and not, as is sometimes assumed, only more or less well. It is most appropriate, therefore, that the chapter dealing with disease is headed "The Maintenance of Health". How much more important this is!

The book is presented in a most readable form, an important factor these days when the amount of literature one needs to read to keep up to date increases month by month. Application of the science and practice it suggests will enable every farmer to improve his pig husbandry.

J.R.L.



**Third Report on the Agricultural Policies in Europe and North America.** O.E.E.C., Paris. H.M. Stationery Office, London. 24s. (25s. 2d. by post).

Journalists, business men, politicians, students and others for whom facts and principles serve various essential functions are already fairly deeply in debt to the O.E.E.C. for its voluminous documentary work. Readers of the surveys of agricultural policies, which emerge from the confrontations undertaken by member countries in the Ministerial Committee for Agriculture and Food, are now presented with a third report. They will no doubt approach it with a special stirring of interest because discussion of general principles now gives place to "getting down to cases".

Nearly three-quarters of this meaty volume is devoted to specific problems, first structural and then those of adjusting the level of production of certain staple commodities.

The structural problems turn out predictably enough to stem chiefly from the existence of too many small farms, but the situations described vary enormously. In Luxembourg, agriculture "must be considered marginal" to the quickly expanding industrial sectors, and the problem is whether farming, with its minutely-fragmented holdings, can be helped to keep up with its big brothers.

In contrast, the Irish Republic has in agricultural land almost her only natural resource, and in agricultural exports the mainstay of her economy. Apart from what industrialization might do for her one day, her salvation, and therefore that of her Congested Districts, seems to lie in the expansion of international trade in the agricultural products which she should be able to produce cheaply.

In the commodity sections cereals, dairy products and meat production are examined, with reference to twelve countries in Europe and North America. There again, there is wide diversity of situation to keep interest alive. At one extreme, for instance, there is the runaway wheat situation in certain Mediterranean countries. Initially expanded to save foreign exchange, and latterly used as the chief medium of agricultural support, wheat production in these countries is now a habit and a prop. Any attempt to curb it in the face of chronic over-supply must now have repercussions on the whole industry and to some extent on the whole economy, while so long as nothing is done stocks and

financial losses accumulate. In more diversified and advanced countries the problems can be just as clearly defined, but the response is sometimes highly sophisticated. In Federal Germany, for instance, the attempt to rationalize meat production and marketing is many-sided, deploying superior market intelligence, expert statistical committees for assessing trends, representative committees administering a policy of stock acquisition for holding in cold storage, and finally import controls. Could it be that by this example of traditional thoroughness the Germans are supplying the last word on price stabilization?

Finally, there are descriptions of four price support systems, including the long-standing U.S. variety and a new Swedish one employing import levies. Here is disclosed a story of human ingenuity lavished upon combinations of index numbers, parity formulae, "a 5 per cent rule" and other wonders to produce what is now a branch of applied mathematics at least as intricate as its cousin taxation.

Surely international understanding can hardly be more effectively furthered than by the provision in volumes like this of thoroughly authenticated information, and of comment which, while necessarily extremely polite, still contains such wisdom and realism.

J.A.E.

**The Law of Agricultural Holdings** (3rd Edition). W. S. SCAMMELL. Butterworth. 55s.

The third edition of this work, which has become a classic, states the law at 1st March 1958, and follows the rather novel arrangement devised for the first edition, which was commissioned by the Royal Institution of Chartered Surveyors and the Chartered Auctioneers' and Estate Agents' Institute.

Mr. Scammell is a well-known writer and speaker on agricultural law, and it is easy to see why this is so. His book is distinguished by the easy style of writing, and a notable simplicity of commentary on lengthy and complicated legislation.

There are almost 500 pages of text, and the eight appendices fill another 200. These include a useful collection of forms; some are official, while others have been prepared by the author to suit circumstances where careful use of words is important, and there is no prescribed form.

The book is a massive work, but perfectly manageable in practice; it is primarily intended for the use of those concerned with land management. But lawyers and students will find it particularly helpful, because of the clarity of explanation and the practical bent given to the commentary on points of law. In addition, this book clearly shows how the author's experience as a leading agricultural lawyer gives authority to what he has to say; for example, wherever possible he refers to cases to illustrate points and this makes the commentary extremely effective.

Agricultural holdings law has become a good deal more elaborate in the last twelve years, and the results of an error in, say, procedure in giving or objecting to a notice to quit can have far-reaching consequences. Ignorance of the law has never been a valid excuse for the layman, and these days meticulous observance of the procedure is necessary to success in doing what one has to do under its processes.

Like the previous editions, the book is well produced and a pleasure to handle.

R.G.A.L.

#### Introduction to Soil Science (3rd Edition).

G. W. LEEPER. University of Melbourne Press. Cambridge University Press (London). 30s.

There appears to be some considerable demand for a book of this nature when a third edition is called for within ten years of the first. It is, therefore, a pity to find that the opportunity was not taken to remove some of the blemishes by making simple alterations: for example, the connection between Fig. 10 (length of growing period) and the text discussing the leaching effect of the climate could have been made closer: by rewording a sentence the impression could have been removed that kaolinite, halloysite, and free aluminium oxide are red sesquioxides colloids. Small points like these, when numerous, detract from a book's value, and yet they are so easily corrected.

To readers of the previous editions Professor Leeper's style is no surprise, and indeed it is refreshing to read a text-book in which the author can almost be seen at work. "The scheme of classification given here does not coincide with any given elsewhere." "Most people . . . have an exaggerated idea of the value of chemical analysis of soil." "The purpose of these (nitrifying) tests has not always

been clear to the agricultural scientists concerned." To some extent, therefore, the book is a personal testimony rather than a text-book, and is provocative and irritating in so far as the reader cannot put "the other side" of the discussion on some of the controversial topics.

Perhaps it is just as well that the complete reorganization forecast in the preface did not occur, for it appears that less emphasis would have been given to mapping, classification and formation and more to the physics and chemistry of the soil and to erosion: *Leeper* would then have become just one more of the prosaic accounts of soil properties. Such books are necessary and useful, but an interesting account (and how interesting it could be!) of the development of Australian soils would be much more stimulating, and of more use in other lands turning to scientific land-use, for the past can often be made the gateway to the future.

D.A.O.

#### Flower-Growing for Shows. E. R. JAMES. Penguin Books. 5s.

How glad my friend, the late E. R. James, would have been to see his excellent book produced as a Penguin, thus increasing its circulation and usefulness. James was an artist, but a very practical one. He trained as a gardener and knew his plants—and knowing them as friends, he was able to display them at shows so that they gave of their best.

His book does him justice, for it passes on to the keen exhibitor all those tips and hints which James had learnt in a hard school and which, because of his experience as a lecturer at Reading, he describes in a simple, understanding manner.

He starts by detailing clearly the "tools" needed for the job. With great care he then enumerates the many different flowering plants that may be shown, giving their cultural needs and emphasizing the attention to detail needed in the cutting, preparation and display. He does not forget the pot plants or their special packing, while either he or a friend has carefully illustrated all the finer points with first-class line drawings—150 in all.

The book rightly ends with transport and staging—for it is little use growing the flowers properly if they are ruined on the way to the show, or are displayed badly. I can strongly recommend this Penguin to intending exhibitors.

W.E.S.C.

## BOOK REVIEWS

### **Practical Animal Husbandry** (7th Edition).

W. C. MILLER and E. D. ROBERTSON.  
Oliver and Boyd. 31s. 6d.

In addition to accounts of the traditional and accepted methods of husbandry, the revised and enlarged edition of this well-known book includes accounts of some of the newer systems that have been introduced in recent years. It also deals with the management of dogs, cats and fur-bearing animals. As with previous editions, the emphasis is essentially on the practical details of the handling and management of animals—things that are so important for their well-being.

For those who may not have seen *Practical Animal Husbandry* before, the following will give some idea of the scope of the book. A good account is given of the principles which are fundamental in the proper handling and control of animals; methods for their manipulation and casting are detailed, even to the extent of methods of separating fighting dogs. The giving of medicines, identification of animals, grooming, washing, clipping and clothing are also described.

The sections on all aspects of the practical management of horses are particularly useful. Facts and figures about the livestock industry are given: for example, 49 per cent of all the dairy herds in England and Wales milk between nine and fourteen cows each. Methods of management for both dairy and beef herds are described, and there is an account of artificial insemination. The division of the sheep industry from hill to lowland flocks, together with methods of sheep feeding and management, is outlined.

In the section on pig management such things as trough space, temperatures and rations required for the different categories are dealt with, while that on poultry includes chick sexing, caponizing and de-beaking. The book ends with appendices on "Legal Enactments Relating to Animals" and "Tables Relating to Reproduction in Different Species".

J.H.

### **The Rhododendron and Camellia Year Book, 1959.** The Royal Horticultural Society. 10s. (11s. 3d. by post).

Two-thirds of this book is devoted to the rhododendron, and much of that to descriptions of places where this genus is grown in a wide range of species and hybrids. A good account is given of how

some of the newer introductions are faring, and another interesting one tells of a collection of dwarf species and varieties, which should appeal to many whose gardens cannot take more than two or three of the larger specimens.

From Germany comes the story of the creation of a rhododendron collection in a pine wood. It is instructive to note that, though intensive hybridization of this genus is a new venture in that country, considerable strides are now being made on at least one nursery; particular attention is being paid to hardiness and also to the selection of forms which tolerate lime.

The problem of lime is discussed in an interesting article by Dr. H. Tod, whose work indicates that it is calcium which is detrimental to most species of rhododendron rather than a high pH.

For the azalea enthusiast the story of Wilson's Kurume azaleas and the report on their hardiness, as shown in trials at Wisley, is well worth reading. There are accounts of shows, both in this country and in the U.S.A., and in "Rhododendron Notes" I read with great interest of the experience of one nurseryman with weed-killers amongst rhododendrons, azaleas and camellias.

In this country the blossoms of the camellia are often seared by March winds, which may explain why it has fewer devotees than the rhododendron. Where shelter can be provided, the camellia will bring rich rewards, and many will read the account of its cultivation in Southern California with some degree of envy. A progress report is given on the work of preparing an international check list of names of camellias in cultivation, which is one outcome of the 1955 International Horticultural Congress.

The Year Book is well illustrated by many fine black-and-white photographs, and it will take a well-deserved place alongside previous issues.

J.R.

### **The United Kingdom Dairy Industry.**

Edited by Professor E. L. CROSSLEY.  
United Kingdom Dairy Association.  
20s.

Much effort was put into making a success of the XV International Dairy Congress, which was held in London at the end of June 1959. That it was a success is widely acknowledged, and reviewing *The United Kingdom Dairy Industry*

## BOOK REVIEWS

affords an opportunity for adding to that acknowledgement, since the book was prepared under the auspices of the Congress.

At previous congresses the host country has produced a descriptive booklet on its dairy industry, and delegates from the United Kingdom have felt that ours merited a similar treatise. We now have it. There was undoubtedly a need for such a comprehensively-descriptive book, and the holding of the Congress in the United Kingdom provided the occasion for the initiative to be taken. The result could not have been better.

A congress, when over, leaves some people wondering whether it has had any but a transient impact; this book, at least, is a lasting acquisition and the Association is to be congratulated on making it generally available.

The range covered by the sixteen contributors is wide, and no aspect of the dairy industry is ignored, nor any inadequately portrayed. The illustrations are profuse and excellent; those of breeds of cattle and of varieties of cheese are in colour and add a worthy touch of adornment to a very fine example of book production.

The chapters—each on a different aspect of the industry—are rationally arranged and well balanced, without preponderant treatment of any one subject. The book has been kept to a commendable brevity, not an easy restraint to exercise when comprehensiveness has to be achieved. It could have been tempting to include a historical survey, and an account of legislation and other subsidiary aspects, but these have been eschewed. Consequently we have a concise, readable and informative description of our dairy industry as it is today, and a worthy reminder that the United Kingdom is one of the chief dairying countries of the world.

K.H.B.

**Farm Accounts and How to Use Them.**  
DAVID WALLACE. Farmer and Stock-Breeder. 2s. 6d.

Last year a Ministry bulletin, *Records and Accounts for Farm Management*, was prepared by Mr. A. G. Jeffrey. It presented a comprehensive picture of how to prepare farm accounts and interpret them for management purposes. Mr. Wallace's booklet might be regarded as a simplified version of that bulletin, designed to appeal

to those farmers who have neither the time nor the inclination to keep or study detailed account books. They will find the simple records discussed in this booklet very useful in checking the success of their farming operations.

Attention is first given to the accounts of the farm as a whole—how to keep a straightforward cash analysis book and how to prepare the accounts to show the profit or loss made during a year. Some of the reasons for the profit or loss can also be seen from the accounts. Is the farm producing enough? Are yields satisfactory? Is there too much labour and machinery in relation to the level of production achieved?

After obtaining answers to these questions by examining the general performance of the farm, Mr. Wallace then shows how various enterprises which make up a mixed farm can be checked. He suggests a few check points which will give adequate guidance without any elaborate recording. These sections are particularly useful to farmers wondering if one or two of their farm enterprises, say pigs or poultry, are paying their way.

This publication has the virtue of brevity and simplicity, but it is in danger of oversimplifying some of the management aspects of farming. It is nevertheless a useful introduction to the subject of farm business management.

The booklet has an appropriate final comment. "It is only by acting on the results (of the checks) that any benefit can be obtained. . . . it is surprising how many people get so wrapped up in calculations and records that they forget the purpose of them."

K.D.

**Board Mill Survey, Economic Study, United Kingdom.** H.M. Stationery Office. 5s. (5s. 6d. by post).

In 1958, the Forestry Commission engaged a Vancouver firm of consultants to study the feasibility of establishing a board industry in this country. The results are published in this volume, which contains descriptions of processes, plants and estimated costs and earnings of mills producing 35 and 70 long tons of board per day.

*Board Mill Survey* is complementary to a recently published O.E.E.C. report on the setting up of small-scale softwood pulp mills.

## BOOK REVIEWS

### 5 Common Enemies of the Poultry Farmer. R. F. GORDON. Poultry Association of Great Britain. 1s.

Many poultry farmers will be familiar with the five diseases described in this booklet, and they will have realized that our knowledge of these conditions is far from complete. As a result of field experience, laboratory work is undertaken in this country and abroad to help in finding an answer to some of the more pressing problems, but inevitably the results of such work are not always immediately available to the poultry farmer. It is essential, therefore, that from time to time a summary of our knowledge should be presented in a straightforward manner to enable the farmer to keep abreast of the latest recommendations. The notes by Dr. Gordon will serve this purpose admirably.

The five diseases, epidemic tremors, caecal and intestinal coccidiosis, the leucosis complex and fowl paralysis, fowl typhoid and pullet disease, are dealt with in the order in which they may be expected to occur in the flock; that is, from the day-old chick up to the end of the first laying period. Each disease is described in sufficient detail to enable the farmer to recognize symptoms and the changes which are produced in the dead bird. However, Dr. Gordon has rightly emphasized that some conditions require the more detailed examinations which can be carried out only in the laboratory. Such facilities are now available to all poultry keepers and ensure a prompt and accurate diagnosis.

Probably the most useful parts of the booklet are those dealing with the latest methods of disease control. Under this heading the author has included recom-

mendations on the preventive and curative treatments of coccidiosis and fowl typhoid, and a brief explanation is given of the rather complex factors which can influence the incidence of leucosis. In the case of epidemic tremors and pullet disease, for which at present no recognized methods of treatment are available, general advice is given on the steps which the poultry farmer can take to avoid serious loss.

S.F.M.D.

### Pea Growing Research Organisation Annual Report, 1958.

During 1958 the Pea Growing Research Organisation's activities included work on new vining varieties, the control of pests and diseases, combine drilling, and the Dried Pea Seed Approval Scheme.

Full details are given in the Organisation's recently published Annual Report, copies of which are available, free of charge, to subscribers of the P.G.R.O. Associateship and research levy schemes. Non-subscribers may obtain copies from the Secretary, Pea Research Station, Yaxley, Peterborough, price 1s. 6d. post paid.

### Books Received

*Diseases of Livestock.* T. G. Hungerford. Angus and Robertson. 75s.

*Farming the Land.* Victor Bonham Carter. Routledge and Kegan Paul. 15s.

*Experiments in Progress, No. 11.* (Annual Report for 1957-58.) Grassland Research Institute. 7s. 6d.

*Thirty-ninth Annual Report of the Forestry Commissioners for the Year Ended 30th September, 1958.* H.M. Stationery Office. 5s. (5s. 4d. by post).

*Rural Industries Bureau Annual Report, 1958-59.* 1s. 6d.

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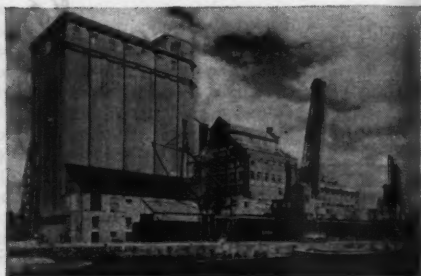
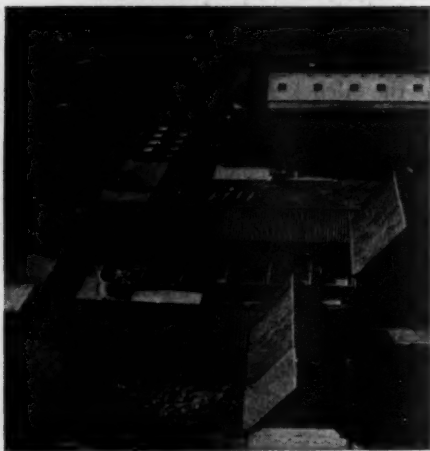
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